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[Special Editorial Correspondence.]

FOURTH ANNUAL MEETING, ILLINOIS GAS ASSOCIATION.

CONGRESS HOTEL CO., AUDITORIUM DIVISION, CHICAGO, ILLS., March 25th, 1908.

Dear JOURNAL: With 140 members present, the Fourth Annual Meeting of the Illinois Gas Association was convened this morning with great enthusiasm. The President (Mr. J. H. Eustace) called the meeting to order promptly at 10 A.M., and opened the proceedings by introducing Mr. Emil Welten, who, on behalf of the Mayor, welcomed the Association to Chicago in excellently well-chosen words. The address was gracefully responded to by Mr. Edward G. Pratt. The first business of the session was a proposed change in the by-laws, arranging for the admission of a new class of associate members, which change was unanimously adopted. The formal reports of Secretary Quackenbush, as well as those of the Treasurer, were read, and the documents certainly proved the Association to be in particularly good condition in every respect.

The report of the Executive Committee was particularly notable for the favorable action taken in respect of the accessions to all classes of membership. The rolls now show a membership of 178. The articles of the affiliation of the Association with the objects and purposes of the American Gas Institute were fiually ratified, which means that the former is now associated with the latter in its work. Tomorrow we will elect a member to represent us on the Institute's Board. President Eustace then read his address. As was expected it proved a most thoughtful presentation of important, live issues in the gas industry, and it will be well worth careful perusal by all directly interested in our calling. The paper by Mr. W. E. Hartman, of Aurora, gave rise to a vigorous discusion, in which the field of "Retort House Practice" (such was its title) was well covered. Adjournment followed the discussion. The Committee on Arrangements (and it certainly knows how to take care of the troubles and cares that are upon it) reported that the success of the banquet is assured. Over 200 tickets have been disposed of, and the list of speakers is lengthy and brilliant of promise.

The afternoon session was devoted mainly to a consideration of the commercial side of the industry. The first of the papers read was that by Mr. D. McJunkin, of Chicago, whose citation of "The Point of View in Advertising Gas" might well have been in the plural, for certainly its "points" were many and marked. The second number was entitled "New Business Methods," which descriptions were furnished by Mr. C. H. Sidenglanz, of Rockford. The joint discussion on these excellent papers was carried along until late in the afternoon, and it never lacked interest for a moment. A notable incident of the day happened when Mr. Lucius S. Bigelow, of your city, as Secretary of the National Commercial Gas Association, was granted the privilege of the floor. His remarks were mainly directed to the benefit that would arise from the proposed exhibition of gas appliances by the Commercial Association some time next winter. Mr. Bigelow's speech was hailed with acclaim, and a resolution was unanimously adopted to urge upon the Commercial Association the advantage of holding this exhibition in Chicago.

No special entertainment is on to-night, but various dinner and theater parties have been nicely made up. The weather conditions are superb, and a rousing spirit of infectious enthusiasm prevails. Everyone is having a good time, including the agile Sergeant-at-Arms, "Fred." R. Persons.—C. H.

[Our messages for the concluding day of the meeting (Thursday, the 27th) not having come to hand by noon of Friday, the detail thereof is unavoidably put over a week.—Ed.

LIBRARY OF CONGRESS MAR 30 1908 SMITHSONIAN DEPOSIT.

BRIEFLY TOLD.

"A Loving Cup for Mr. John A. Coffin.—There is no room for doubting that at least every New England gas man knows John A. Coffin, of rugged Gloucester, Mass., and there is reason in plenty for knowing that everyone who knows him loves him. Plain and unassuming, always cheery, his smile is as the sunshine, his ways are as the paths that lead through the treasures of nature's reawakening in the spring. Why, do you say, this gush about such a matter-of-fact man as the Dean of Gloucester certainly is? Well, if all your readers were present at Young's Hotel, Boston, the afternoon of the 14th inst., when, the annual dinner having been happily put away, Captain McKay, as President of the Guild of Gas Managers, told in set phrase what the members thought of ex-President Coffin, you would know. The speech was the prelude to the presentation to the Colonel of a massive loving cup in silver, suitably inscribed. It is needless for me to say or write anything of our Captain's tactfulness or of his capability to paint in words the picture that is framed in his heart, and I will venture the prediction that, calm and unruffled as is his wont, John A. Coffin was never closer to dumbness than he was when the full understanding of the act and its significance appealed to him. Stumped though he was, the Gloucester man rounded to in a fashion that proved his resourcefulness and well exemplified his appreciation of the fraternality that prompted this pleasantest episode of the Guild's annual meeting.—C."

Death of Mr. Andrew Hutchison.—Death, on the morning of the 20th inst., took from the Providence (R. I.) Gas Company, in the person of Andrew Hutchison, an employee of the corporation who served it with fidelity and success for 39 years. Andrew Hutchison was born in East Providence, R. I., January 16, 1836. Having acquired a common school education he engaged in the service of the New England Butt Company with which he remained until the spring of 1869, when he was appointed Assistant Superintendent of the Providence Gas Company. He continued in that position until the then Superintendent of the Company (the late Mr. Jas. H. Armington) resigned, to assume the Chief Engineership of the Brooklyn (N. Y.) Gas Light Company—this was early in the eighties. He succeeded Mr. Armington as Superintendent of works, and in that position he remained to the end. Plain, unassuming and retiring in manner, he nevertheless was a thoroughly proficient man in his calling, and his record is that of a man whose life's work was well done. He was prominent in Masonic circles, and had for years been a valued member of the congregation of the Matthewson Street Methodist Church of Providence. He is survived by a sister (Mrs. Samuel G. Stiness), two sons and a daughter.

More Matter from the Bureau of Information.—We have received from Mr. W. A. Baehr, Chairman of the Information Bureau of the American Gas Institute, the following budget relative to matters incident thereto. Three new questions are submitted—these being numbered 14, 15 and 16. It was also thought best, owing to the seeming ambiguity of Question No. 13, to publish it in revised form, as below—remember, replies to these questions are to be sent to Mr. W. A. Baehr, at his address in St. Louis, Mo.:

Question No. 13.—"What is the percentage of variation per minute in the amount of air that we put through the generator per blast, taking the first minute of the run, with carburetter blast valve closed, as 100 per cent.?"

Revision, No. 13*a*.—"What is the variation in the amount of air put through the generator per blast, taking the first minute of the blast, with the carburetter blast valve closed, as unit?"

Revision, No. 13*b*.—"Plot blast valve curve of water gas generator, using as ordinates the rate of blast in cubic feet per minute, and as abscissæ the time interval of 1 minute?"

Question No. 14.—"How many gallons of ammoniacal liquor of 10-ounce strength is it possible to obtain from the various gas coals in the United States?" This information is desired in particular for Pittsburgh, Virginia, West Virginia and Tennessee coal.

Question No. 15.—"What is the process adopted and standard for testing the candle power of coal gas? Would a 'Knott jet photometer' give one as close a test as the above process we refer to; if not, how close, approximately?"

"Is 16-candle power for coal gas the most economical for the consumer, both as fuel and for light, used in mantle burners? Would a change from 16-candle power coal gas, either lowering or raising same, favor the consumer for fuel and light, or would the above change be a detriment to the illuminating, or *vice versa*?"

Question No. 16.—"At about what cost can hydrogen gas be produced? Has hydrogen in itself any illuminating value? Can it be compressed without losing its calorific value? Is it as explosive as acetylene?"

Instruction in Illuminating Engineering in Technical Schools.

In an article printed in *The Illuminating Engineer* for March, on the topic named in the heading, Prof. W. E. Wickenden, of the University of Wisconsin, has this to say ament the practice of the University in this respect:

* * * The following synopsis of a course now in progress will serve to illustrate the methods employed, the topics treated and the points of special emphasis. The lack of an adequate text-book makes necessary a combination of the lecture and seminary method in the work of the class room. Supplementary mimeographed notes embody in concise form the essentials of the lectures. Wherever possible illustrative problems are assigned, these having been found of especial value in dealing with the application of polar distribution curves and Rousseau diagrams, the use of the concepts and units of luminous flux, the calculations of illumination, the economics and illuminating value of various units and the design of typical systems of illumination. The general topics treated in the class room follow the following order: The nature and scope of illuminating engineering; the elements of light, its production and the phenomena of its propagation: the concepts, units and terminology of light and illumination; the principles of vision and the physiological features of illumination; photometric devices and their use; standard sources of luminous intensity; the representation and application of photometric data; the Rousseau diagram and its applications; the calculations of illumination; the thermodynamics of light production by incandescence and luminescence; incandescent electric illuminants—their materials, manufacture, accessories, thermal characteristics, operating characteristics, rating, performance at different frequencies, testing, color values, and a comparative resumé of their economies of operation and their illuminating value; the properties and characteristics of carbon, luminous and mercury arcs, and of vapor and vacuum tube illuminants; gas and gas illuminants; shades, reflectors and fixtures; general considerations and methods of design for various classes of interior illumination, illustrated by the preparation of plans for class room discussion; street lighting; decorative and display lighting; and the elementary principles of art applicable to illumination.

Supplementary to this course of class room exercises is a series of experiments in the photometric laboratory of which the following list is typical: A comparative study of the principles, structure, sensitiveness and applicability of photometric screens of the types most commonly used; distribution curves of incandescent lamps; characteristic curves of lamps of different filaments; standardization of incandescent lamps by a hefner standard; tests to determine the conformity of a given lot of lamps to standard specifications of rating, efficiency, etc.; tests of the operating characteristics and light distribution of Nernst lamps; tests of spherical candle power and hemispherical candle power by the Rousseau diagram and by the interests of interior illumination and street grating photometer; tests of shades and reflectors for efficiency, light distribution and intrinsic brilliancy; the calibration and use of the Weber photometer; illumination; tests of gas illuminants; tests of the mercury vapor arc; photometric test of the inclosed or luminous arc.

Much of the interest and emphasis of the course is placed upon the application of the principles developed to relatively simple problems of design. To each pair of students is furnished a plan and description of a building and a statement of the gas and electric service conditions available. Near the end of the course several sessions are devoted to a discussion of these plans. The students to whom they were assigned are required to point out the considerations demanding attention in the illumination to be provided, to discuss the alternatives considered and to describe the system recommended. The plans are then freely discussed and criticized by the class. During the past semester the following plans were considered: A machine shop and foundry, a retail store, a church, a college building, a theater, a residence, an assembly hall, a public library and a public square and the adjoining streets. Some excellent discussions ensued and the intelligent interest evinced would have been creditable to a session of a section of the Illuminating Engineering Society.

The plans for the extension of the work include a laboratory course in the photometry of gas and oil illuminants, which is expected to be of especial interest to students in chemical engineering. Should the demand warrant, a course in the practical elements of illumination will be offered in the coming summer session for the benefit of the practical electrical workers who usually are in attendance. A correspondence course in lighting, in which many of the practical elements of the course above outlined will be given, is projected by the university extension department.

[Official Report.—As Furnished by the Secretary.—Continued from Page 444.]

THIRTY-EIGHTH ANNUAL MEETING, NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

Held in Young's Hotel, Boston, Mass., Feb. 19 and 20, 1908.

First Day—Morning Session.

On motion of Mr. Africa the thanks of the Association were extended to Mr. Gardiner for his interesting and valuable paper.

The President then asked the Secretary to read the

ROLL CALL,

after which he presented Mr. H. C. Crafts, of Pittsfield, Mass., who read the following paper on

MANUFACTURE OF GAS FOR BALLOONS.

[For the text of the Crafts' paper, see Journal, March 23, p. 487.]

Discussion.

The President—Gentlemen, I am sure we will all agree that that was a very gentle ascension. Mr. Crafts certainly landed safely on his feet again. Are there any questions you would like to ask him? It is a paper that can hardly be discussed, but some interesting questions might be asked.

Mr. Campbell—This is an interesting subject. I don't suppose all of us will be given opportunities to charge balloons, and am not sure whether active advertising or canvassing will draw the business. I should gather from Mr. Crafts' last remark that it was not altogether a profitable business. Some of us perhaps feel a little bit envious at others getting customers who take 30,000, 40,000 and 50,000 cubic feet of gas at a time. I would like to know a little more about the business, and incidentally, perhaps, whether the charge for the gas is on a demand basis or on a flat meter rate.

The President—Those are very pointed questions. Before Mr. Crafts replies, will any other questions be submitted to him? If so, now is the time to submit them.

Mr. Nettleton—As a matter of curiosity, I would like to ask Mr. Crafts how fast the balloon "Stevens 21" arose. There is a difference of only 3 pounds between the weight of the balloon and contents and the weight of the corresponding amount of air.

The President—If there are no more questions, Mr. Crafts.

Mr. Crafts—As to Mr. Campbell's suggestion I would say there is no particular money in the balloon proposition. We are in it because we are in it, andwe make a special price to them. A good deal of incidental labor is connected with it, and we seldom know a great while in advance whether they are coming or not. We get a telegram and have to be ready for them perhaps in 8 or 10 hours, and they may not come at all, or there will be so much wind that we will have to use our water gas relief holder for the storage of balloon gas for perhaps a day or two longer than we otherwise would like to. Respecting Mr. Nettleton's question about lifting power, I would say that the 13½ bags of ballast constituted the actual weight in the basket when the balloon actually cleared the ground. Most of these ascensions are made along in the fall, and at which time as you go up and it becomes much colder, quite a lot of sand has to be discarded almost at once, sometimes 40 or 50 pounds. Occasionally a whole bag will be thrown out almost instantaneously. The way the balloon leaves the earth is, however, gradual. It is just a very slow, gradual rising.

On motion of Mr. Africa a vote of thanks was tendered to Mr. Crafts for his interesting paper on an original subject.

A Dip into the Question Box.

The President—We will dip at this time into the Question Box. The first question that presents itself is:

"What is the effect of using a retort house governor?"

Has any company used a retort house governor, or does anybody know anything about retort house governors? It must be in connection with the one that I think was patented by the late Mr. George Livesey, of the South Metropolitan Gas Company, London, in connection with the regular attachment to the exhauster. That question does not seem to be one that brings out a great deal of discussion. Another one is:

"How can breeze and other low grade fuels best be burned?"

We shall be very glad to hear from anyone who can throw light on this question.

Mr. Africa—We have a steam blower to give a forced draft—that is, a forced amount of air under the grates to burn breeze, and it works very satisfactorily. Another appliance we have used is a rocking grate.

Mr. Barnum—Does Mr. Africa try to maintain a slight pressure under the boiler in the boiler setting?

Mr. Africa—You get a slight pressure, but we have not made any test to determine what that pressure is. It is a Parsons blower.

Mr. Barnum—Is the stack damper checked off at all; or is it left open?

Mr. Africa—The stack damper has a steam damper regulator.

Mr. Barnum—That is regulated by the steam pressure, not by the pressure in the setting?

Mr. Africa—By the steam pressure. If the pressure of the steam in the boiler rises to the point at which it is set the damper in the stack closes.

Mr. Kennedy—I would like to ask how that applies to a battery. Suppose one boiler is overrunning the other and your steam blower regulator, one of which is applied to each boiler of the battery, is operated by the steam from its own boiler, where are the dampers connected which are going to regulate each particular boiler's draft? Do you get my point? If you have 6 boilers, as we have, the steam regulator is supposed to regulate number 5 boiler, does regulate that boiler in so far as that boiler itself is concerned, but if it is connected to the main flue, as is generally the case, then the throttle of that particular damper regulator is affecting all of the boilers; in other words, it is not doing its duty on the boiler on which you want it to work. It seems to me you require an individual damper regulator, working on an individual damper from each boiler, in order to throttle or open up the draft at each individual boiler to save fuel.

Mr. Africa—We have a separate damper regulator for each boiler, and each boiler has a separate stack.

Mr. Kennedy—We run a battery of six, and all are connected into one stack with main flue damper, and our proposition has not been a practical one, for the reason that it throttles the main damper, which throttles the boiler that you don't want to throttle. It is a difficult problem to adjust it without a lot of expense to take each individual damper.

Mr. Africa—I should think the most satisfactory arrangement would be a separate damper in each uptake of the boiler. If you have a separate damper regulator for each boiler's pressure, and have a separate damper connected with it, you should get good results.

Mr. Kennedy—Another question I desire to ask in connection with that, for we have been experimenting a little with this breeze, is this:

> "Supposing you are introducing oil gas tar, or water gas tar, at intermittent periods, it is to my mind almost impracticable to have an automatic regulator, unless you have an automatic tar cut-off. That is my experience. It seems to me dangerous."

Mr. Africa—I should think you would with burning tar. We have just burned straight breeze without any tar, so have not had any difficulty of that kind.

Mr. Bill—Mr. President, in Springfield we have batteries of two boilers connected somewhat in the way Mr. Kennedy states. Under one boiler we burn breeze, with the Parsons blower system, and under the other water gas tar. We have no trouble whatever, and have a high evaporation.

Mr. Campbell—Mr. President, while I cannot give any direct experience on that subject possibly I can offer a suggestion that may help one of the gentlemen who just spoke. I have been looking into the subject of combustion under boilers, and think a good deal of effort has been directed in the past towards forced draft. I understand that is considered necessary with breeze. I believe theoretically, however, that forced draft means using a considerable quantity of air, perhaps rather more than is theoretically necessary, which tends to give poor results. Theoretically the less air you can use above the actual amount necessary to consume the coal, the higher your furnace temperature and the better evaporation you get. In our boilers we are just about to try a piece of apparatus—I am sorry I cannot give you the result—which works on quite a different principle from anything in the way of forced draft, and I speak of it because the makers tell us that it will burn breeze satisfactorily. I cannot tell you whether it does or not, but that is their statement. They go altogether on the principle of giving a little forced draft underneath the grate, but choking it off in the stack with a damper, the blower and the damper working together so that the pressure of air is just sufficient to force the air through the bed of fire. There is very little pressure after that. It is what they call a lazy fire, and the stack is only necessary to carry off the products of combustion. Do I make my point clear?

Mr. Kennedy—Yes; but is it steam induced draft, or just an ordinary blower and forced draft?

Mr. Campbell—It is a patented blower, I believe.

Mr. Kennedy—How does it act?

Mr. Campbell—It acts in conjunction with the damper. The damper and blower are connected together in some way—the apparatus is not yet installed, so I cannot give the details—but they work together automatically, and when the pressure is required just enough is given to force air through the bed of fire. Immediately it gets through there is very little tendency for the gases to hurry through the boiler. The result is they go through slower, have a longer time in contact with the surface of the boiler, and impart more of their heat to it. The gases leave the stack at a lower temperature. You start with a higher initial temperature, and the gases leave the stack at a lower final temperature, and impart more of the heat to the boiler. Theoretically I believe that principle is correct, and it might be applied to the burning of breeze very satisfactorily.

Mr. Kennedy—I understand the principle. What I am trying to get at is this. Is it a draft that is forced under the grate as a forced draft only, or is it one that is induced? In other words, there are several different kinds. The type that I have recently been experimenting with is simply a circular casing, with tiny, $\frac{1}{8}$ or $\frac{1}{32}$ holes round the inner circumference, pointing towards the furnace under the grate. Steam is injected into that coil and induces the draft. The other systems are simply to blow air under the grate. The one with steam disintegrates the clinker, the other does not.

Mr. Campbell—This is a blower and blows air under the grate, the pressure and the quantity of air being in proportion to the requirements of the boiler, and the aim is to have just as little pressure and air as possible, and yet let the air get through the fire. After it once gets through there is no effort made to force or hurry it through the boiler. I only speak of this because the makers tell us if we could get any coke breeze we could burn it to very great advantage. We are not able to get it, but I think their theory is correct, and possibly if you follow out this line it may lead to something to your advantage. I cannot state whether it will or not.

Mr. Kennedy—It may or may not be interesting to know that the class of breeze we are trying to consume is the very finest dust from the coke hopper after passing the crushers and conveyors, etc. We found that, using this with a heavy natural draft, we had to clean the fires every 4 hours, with 2 men, which lowered the steam pressure until the boiler was cut out. With this machine, which we worked a week or so, we cleaned once in 12 hours, and, instead of 8 or 10 or 12 barrows full of mixed fuel and ash, we got out about a hat full. The fuel is completely consumed.

The President—We would like to hear something from Captain McKay in this matter. We know that what he has to say is always worthy of attention.

Captain McKay—May I inquire what relation exists between the steam used in the system described by Mr. Africa and the steam generated? If the steam generated in the boiler is 100 per cent., what percentage is used in maintaining the system with a steam blower? I understand that in the later forms of the blower system they cut this percentage down to below 3 per cent. Our own experience would seem to indicate that it runs as high as 6.

Mr. Africa—Replying to Captain McKay's question, as we have not made a test of this blower to see what percentage it is using, I cannot answer.

Mr. Kennedy—In our case it figured a little under 3. I cannot say definitely now, as I did not expect any question to arise regarding it.

The President—Mr. Prichard, we would like to hear from you. They all seem to follow very closely the recommendations made by you.

Mr. Prichard—We have been using breeze for quite a number of years. The best way to use it, that we have discovered at any rate, is one of the patented systems which forces the air under the bars by means of steam jet blowers. This works very nicely. We have no clinkers that I hear complaint of, and we get results from the evaporation by the breeze which are equally good to those of the coke. I might say that this problem came up in the first installation of our inclines, as the coke handling apparatus connected therewith threatened to give us a large amount of breeze, and for some little time we were somewhat worried as to whether that was going to be an expense that we had not foreseen. The problem seemed to be to make the breeze equal to the coke, which we did in just this manner, so that we feel we don't care practically how much breeze we make as long as it is less than the amount necessary to supply the boilers. In connection with the damper suggestion that Mr. Kennedy spoke of, as long as your several boilers are all connected together, and your pressure rises to a point where you wish to shut it off, it is desirable to shut off your main damper, which shuts off the generation of steam in the battery boilers. If one were operating on a tar fire I can readily see that he might have the fumes or the smoke coming from the tar discharged out into the boiler room if he closed the damper tightly, but with any other arrangement I can see that it would be an advantage, not a disadvantage.

The President—Thank you, Mr. Prichard.

Mr. Kennedy—I should probably, to have made our case clear, have stated that our boilers are connected with the so-called automatic crane valve. Under low pressure in the boiler a valve closes down on that boiler, and you have to raise the pressure in the boiler again before you cut it into the battery a second time. Consequently that necessitates in our case a different arrangement.

The President—Mr. Kellogg, we would like to hear from you.

Mr. Kellogg—In Lowell we are using breeze under boilers, but have perhaps a little different arrangement from anything that has been described. We use hollow blast grates, through which, by means of a fan, we can force air. We have made no attempt to put as little air as is absolutely necessary into the furnace; in fact, there are times when the air will blow up through the breeze, creating large holes, which we have to cover with more breeze. We find we can burn the breeze very satisfactorily, but I wouldn't say how efficiently or economically we do so. We have no damper regulator. The engine which runs the blowing apparatus is connected with a Mason regulator, directly to the steam pressure from the main steam header, which slows down the fan or increases the speed of it as the pressure falls or rises in the boilers. We are not quite as efficient as we might be. We burn a little more fuel than necessary to keep up our steam.

The President—The Nominating Committee not being ready to report, we will proceed to the next question:

> "What new and successful devices are being used to extend the gas business?

Will Mr. Barnum favor us?

Mr. Barnum—I should like to ask, not with regard to a new device, but as to the results on an old device, what has been the result of prepayment meters put in in New England in the last 5 years?

Mr. Africa—One old device for a new purpose that I heard of recently was this. One of our customers has a dye house, and he washes a great many shirt waists and women's coats with puffed sleeves. In order to iron them he uses what is called a puffed sleeve iron. It is shaped something like a coat sleeve. The iron is heated with steam. He has ordered a small automatic steam gas boiler for heating the irons. This is a device that some of you may have occasion to use.

Mr. J. J. Humphreys—A device I have used recently consists of two large water heaters to keep up steam on a fire engine.

Mr. Nute—One or two devices, outside of the numerous air blast devices which have been taken up by Mr. Allen and others at the last Institute meeting, I think may be worth while to mention. A little coal or coke heater in connection with a gas range is something that promises great results. It is a device brought out within a year, or two anyway, and has been adopted, I understand, by some companies quite largely; in fact, I heard of one company that used over 300 of them last year. It is an arrangement which can be attached to any gas range, or for that matter, set on legs separately, independent of the range, for heating the kitchen, so that the gas range can be used the year through. It is very economical in working. Of course, no oven is connected with it, so that when it is installed it is necessary to use the gas oven for all the cooking, although the coal or coke fire can be taken advantage of by having two burners on top, so that boiling and that sort of work can be done. Another thing which seems to me is promising very great results is the new inverted arc lamp. Of course, most of us saw it at the Washington meeting, and I had the satisfaction of seeing a number of them in the New York offices of the General Gas Light Company. I have been using one myself about 2 weeks. As first sent out, the orifices were not of sufficient size to burn the requisite amount of gas, but we had that adjusted and got larger orifices, since which time it has been working very successfully. It certainly gives a beautiful light, and without having tested the lamp, I understand it is somewhat more economical than the old style of arc light. It seems there is a very great future for that style of lamp. The increase in the amount of light is certainly remarkable.

Mr. Jenks—What pressure does Mr. Nute carry on this inverted

arc; also what size orifice is so used and the number? What is the size of the pipe?

Mr. Nute—The lamp came with I think No. 6 orifice, which we had changed to No. 2. The pressure at that point varied from 2½ to 3 inches. It is a uniform 3 inches during the lighting hours.

Mr. Jenks—You have not tested the amount per hour that it is using?

Mr. Nute—Not the amount per hour. I am basing the consumption on the fact that the ordinary inverted mantle uses 3 to 3½ feet, as I found by test. I don't know any reason why the mantle in the inverted arc should use any more gas, and on that basis figure 16 feet per hour, or rather less than the ordinary arc with 4 mantles.

Mr. Jenks—You have no trouble with blackening?

Mr. Nute—No trouble whatever so far. It has worked beautifully.

Mr. Jenks—As Mr. Nute has stated, of course this is a new lamp. There has been more or less trouble, and the General Gas Light people have been rather loath to let the gas people have this lamp up to now. We experimented with one, and I simply ask these questions for information. We had some trouble from the blackening of mantles. It is a very beautiful light though, when in successful operation.

The President—It is just that kind of a question you know that brings out this information that every person desires. Other gentlemen here must have some devices which they are using at their places, and the rest of us would like to know it. Of course it is no particular pleasure for Mr. Nute, Mr. Jenks and the others who have volunteered to get up and say what they are using; but they are doing the Association good service by it. Others want to go on in the same line; if it is a hardship to stand on your feet, sacrifice yourself for the good of the Association.

Mr. Gardiner—I would like to ask this question in a little different way. What can be done to stimulate the development of new and successful devices for the consumption of gas? I spoke somewhat along these lines, last January in New York, at the Commercial Gas Association meeting, and in spite of repeating myself I would like to say a word on the subject here. Those who are going hard after the industrial fuel business feel very much the lack of standard recognized appliances for the thousand-and-one uses to which gas may be put, where it may be well used if we only had the means of using it. It is a problem with which we have struggled, and have not found the best solution; in fact we found various solutions very far from the best. In this we keep contrasting the situation with the electrical situation, where there are tens of thousands of devices, I was going to say, for the sundry and various uses of current. Those devices are not only physically successful, but are commercially successful, and are very broadly known commercially through the aid of advertising. They are known to the general public because their manufacturers have them advertised in all the general mediums of reaching the public, not only in the technical mediums of reaching the managers, and the managers co-operate with this campaign. I think that one of the great lacks of the gas business is thorough co-operation and work along the lines of developing physically and commercially the industrial and sundry appliances for the use of gas. We find that lack, for instance, where we are going after these long hour burning customers, these industrial customers. We cannot get standard apparatus. Standard apparatus is not generally known for all the various uses to which it might be put if the apparatus were available. Of course, we find great difficulty in going to a man who has some special use for gas, and saying, "Now, we can get up a piece of apparatus to do that." To begin with, he objects to a special piece of costly apparatus, and further, he does not know anything about the results that will be obtained from it, so that I should very much like to hear any suggestions as to ways and means whereby the development of new standard and successful appliances for other uses of gas could be stimulated.

[To be Continued]

[Continued from Page 495]

Condition of the Coal Briquetting Industry in the United States.

[A paper prepared for the Department of the Interior, by MR. EDWARD W. PARKER.]

Pennsylvania.—It might be supposed that the briquetting industry would have its greatest development in or near the anthracite region of Pennsylvania, where a plentiful supply of raw material is available in the great culm banks created through many years of mining and in the still large amount of fine coal produced at the breakers for which no profitable market has yet been found. Up to the present time, however, there are but two briquetting plants in operation in the State, and one of these is located at Point Breeze, in the city of Philadelphia. The other is located at Dickson, a few miles from Scranton. Both were put into operation in 1906. The plant at Dickson is in the immediate vicinity of the mine of that name operated by the Delaware, Lackawanna and Western Railroad, and uses the fine coal or screenings, below marketable sizes, that come from the washery operated in connection with the mine. The owner of this plant, the Scranton Anthracite Briquette Company, withholds information relative to the details of its operations. The writer has been told, however, by one of the officials of the Company, that the base of the binding material used is coal tar pitch, and that the plant is producing at present (April, 1907) from 300 to 325 long tons of briquettes per day. It is the intention to double this output by running the plant night and day. The briquettes are of the oval or eggette shape, the press being of the Belgian type and similar to the American machine used at the testing plant of the United States Geological Survey at St. Louis during the exposition period.[1] The entire product is taken by the Delaware, Lackawanna and Western Railroad, for use principally on its locomotives.

The plant at Point Breeze is owned and operated by the United Gas Improvement Company, and was constructed for the purpose of utilizing the coke breeze produced at the retort houses of the Company. As at the Dickson plant, the product is not placed on the market, but is used by the Company in its retorts for the manufacture of water gas. The writer is indebted to W. H. Gartley, Engineer of Works, of the United Gas Improvement Company, for the following detailed description of the plant:

It has been found advantageous to use a mixture of anthracite culm and coke breeze, with 5 to 7 per cent. of coal tar pitch as a binder. The proportions of culm and coke used are variable, according to the quantity of material on hand. At the time the writer visited the plant (November, 1906) 3 parts of culm to 2 parts of coke were being used. The press is of the Belgian type, producing eggettes about the size of a goose egg. The rated capacity of the plant is 10 tons of eggettes per hour. It has been in operation regularly, producing 90 tons per 9-hour day, except when it has been shut down for repairs and changes.

The breeze or screenings from the coke screen fall into a pocket or hopper, into which is also pumped the culm. The contents are raised by an elevator into a storage tank, discharging through the funnel-shaped bottom on to an automatic feed table, by which a measured stream of the material is continuously poured, part into the crusher and part directly into the hopper below the crusher. The material is then elevated and discharged into the drier. The dried material, together with the dust from the dust chamber of the drier, is elevated and discharged through a shaking screen into a storage tank located above the mixer. All material not fine enough to pass through the screen is returned to the crusher. The dried material is discharged through the funnel-shaped bottom on to an automatic feed table, by which a measured stream is continuously poured into the mixer. Into the feed end of the mixer is also poured a continuous stream of liquid pitch through a positive measuring faucet driven from the driving mechanism of the mixer through a variable speed device. The pitch is brought into the building as broken from the pitch bays of the tar distillery, fed into a pitch cracker, elevated and discharged into large steam heated pitch storage tanks, where it is melted. From these tanks the melted pitch is drawn, as required, into a smaller steam heated tank, to which the faucet previously mentioned is attached.

The warm, dry and continuously measured crushed breeze and culm, together with the melted and continuously measured pitch, are thoroughly mixed and kneaded in the steam-jacketed mixer. The mixed mass is discharged from the mixer, divided into two streams, and carried by two mixing conveyors, allowing time for cooling and setting, into the feed pans of the two presses, purchased in France. The presses form the eggettes and discharge them on to the shaking screens below, which screen out the waste and fines. They are then discharged on to a woven wire belt conveyor, on which they have time to cool and set, and conveyed either to the cars or to the hoppers from which the buggies for the generator house are filled.

The waste and fines from the shaking screens under the presses are conveyed by conveyors to a hopper at the discharge of the drier.

Screenings from the eggettes taken from the storage piles are returned by an elevator to the discharge of the mixer and assist in the cooling of the heated mixture.

California.—The manufacture of briquettes has shown more actual progress in California than in any other State of the Union. This has been brought about through efforts to improve the fuel quality of the

1. Bull. U. S. Geol. Survey No. 311, and Prof. Paper No. 48, 1906.

rather low grade California sub-bituminous coals, and has been encouraged by the high prices of the better grades of bituminous coal or anthracite brought into the State from Washington, the Rocky Mountains and the Eastern States, or imported from British Columbia, England, Australia and Japan. It has also been encouraged by the abundance of cheap asphaltic pitch, which can be obtained from California petroleum and which not only serves excellently as a binder, but adds to the calorific value of the briquetted fuel.

The first plant to be put into successful operation in California was one built at Stockton by the San Francisco and San Joaquin Coal Company. The plant was completed in 1901, and when running at full capacity could produce 125 tons of briquettes per day. The fuel used was sub-bituminous coal from the Tesla mine, in Alameda county. The plant was, unfortunately, destroyed by fire in 1905 and has not been rebuilt. It is stated that the plans of the Company were to rebuild the plant at San Francisco, but these were upset by the earthquake and fire which destroyed a large part of that city in April, 1906. A complete description of the Stockton plant, by the designer of the presses, Robert Schorr, of San Francisco, was published in the *Engineering and M ning Journal*, August 18, 1904. The briquettes produced at this plant were round, convex lenses or "boulets," which weighed from 6 to 8 ounces.

The Western Fuel Company, of Oakland, completed early in 1905 a briquetting plant, also designed by Mr. Schorr.[1] In mechanical construction this plant differs materially from the one destroyed by fire at Stockton. The shape of the briquettes is cubical instead of "boulet." The advantage claimed for the cubical shape is that the briquettes ignite more readily, though it is admitted that there is more waste in handling.

The capacity of this plant is 480 briquettes per minute, or 8½ tons per hour. The fuel used is coal yard screenings from lignites, anthracite and sub-bituminous coals, with about 7½ per cent. of asphaltic pitch. This pitch is obtained by the distillation of California crude petroleum. The temperature of the still for the production of pitch of the proper grade is about 600° F. Some difficulty has been experienced in obtaining suitable pitch on account of the tendency of the refineries to "rush the stills," their aim being the production of refined oils rather than pitch. An excellent asphaltic pitch is obtained by keeping the stills at a temperature of 500° F. and using a vacuum to force the distillation. Grade "D," the quality best adapted for the purpose, is fairly hard up to 60° F., but begins to soften above that temperature. It becomes liquid at 250° F., and has a specific gravity of 1.05 to 1.1.

Before the earthquake the Western Fuel Company paid $10.50 per ton for the ordinary pitch "D" delivered at its plant, and a properly and carefully prepared pitch was worth from $12 to $13. Owing to the enormous building activity in San Francisco since the earthquake the demand for asphaltum for roofing materials has increased by leaps and bounds. Consequently there is a great scarcity and the price per ton ranges now from $14 to $20. This scarcity necessitated many shut downs of the plant at Oakland, and for that reason the Company is negotiating for the importation of coal tar pitch from the East and from Europe. As three new refineries are contemplated, conditions may gradually return to their normal state.

All of the coal purchased and used by the Western Fuel Company is brought in ships and is unloaded by electric hoists into receiving bins. When drawn from the storage bins it is screened, all material that passes through the perforations dropping into auxiliary bins from which it is fed into a Williams crusher. This disintegrated coal from the crusher is elevated into the iron hopper of an automatic feeder that feeds into the coal heater. The heated coal enters the mixer, where it meets the binder. The mixer, the binder distribution, and the tempering of the mixture embody some novel features.

The prepared material is conveyed into the feed hopper of a Schorr press, style "A," which is belted for 6 revolutions per minute. At that speed 480 briquettes of 9½ ounces in weight are discharged per minute, or more than 17,000 pounds per hour. The briquettes are rectangular in shape, with rounded corners, and uniform in size, 2½ by 2½ by 1¼ inches, and are branded with a "W." They have a specific gravity of 1.22. All wearing parts of the press are lined with phosphor bronze, and are thoroughly lubricated under an air pressure of 40 pounds to the square inch. Oil is also atomized and sprayed into the molds and upon the plungers.

The briquettes drop upon a short conveyer that delivers them to another one located outside the building. At this point they are sacked for the local market or taken to the top of the storage bunkers, where they are discharged into cars or distributed into the bunker compartments. The average output is 64 long tons per shift of 8 hours. Four men are employed, one of them getting $4, one $2, one $3, and one $2.75 per day, which makes about 20 cents per ton of briquettes. By running 24 hours a day over 200 tons could be made, which would reduce the labor item to about 14½ cents per ton. This can be further cut down by speeding the press up to 7 revolutions per minute. This would produce 560 briquettes per minute, or 20,000 pounds of 9½-ounce briquettes per hour. With a forced feed attachment a further increase in speed may be possible.

Since the foregoing was written wages have been increased considerably, most of the men getting $3.50 per shift, working through the lunch hour.

The present pressure arrangement was tested up to 48,000 pounds, exerted on two 2½ by 2½-inch surfaces, making over 3,700 pounds per square inch. The adjustment is placed to give about 2,900 pounds, which is ample and makes a better burning briquette than when a greater pressure is used. The press is figured for a maximum pressure of 6,000 pounds.

The following description of the briquetting press is taken in the main from an article by Mr. Schorr:

Two soleplates with heavy bearings are arranged to carry a stationary steel shaft, on which a large spur wheel is revolving, driven by means of gearing, countershaft and friction clutch pulley. The spur wheel rim is made integral with a mold ring, which has a series of holes and sliding plungers (pistons) therein. The pistons are under the continuous control of cams, which are supported by heavy shields. The pistons are released from the cam way only when the final pressure is applied, and this is done by a large wheel with steel tire, pivoted in two levers. This wheel is pressed against the piston heads by means of an adjustable spring which permits a perfect regulation of pressure up to 4,000 pounds per square inch. After leaving the pressure wheel - that is, after the briquette is made—the plungers are gradually forced forward to eject the briquettes, which drop upon a vibrating discharge chute. The pistons are then gradually withdrawn and in passing the feed box the cavities become filled with the mixture of coal and pitch. At the end of this feed box all surplus material is scraped off by a steel plate. After passing the scraper plate the pistons are gradually forced in, pressing the material against the resistance block, which is supported by the main shaft. This pressure is effected by a cast iron stand with phosphor bronze liner. When the pistons are about ¼ an inch from their terminal they strike against the rocking pressure wheel and are forced home. In this way the briquettes are made and the play repeats itself with every revolution.

The machine is entirely self contained, and it is claimed that there is no possibility of its getting wrecked by overfeed or obstruction. It is also claimed that, as the pressure is applied slowly and gradually, this type of press permits briquetting mixtures containing 13 to 14 per cent. of moisture, and that this is an advantage not possessed by intermittently acting presses. Up to the present time two styles have been made - one with 2 rows of 2-inch cylindrical molds and the other with 2 rows of 2½ by 2½-inch rectangular shapes with rounded corners. There is no difficulty in making other shapes and heavier briquettes. A simple arrangement permits working with half the capacity whenever desired. No complications are presented if it is desired to have more than 2 rows of molds, and the press can be built for a much larger capacity. On the other hand, should the market for briquettes be lessened for some months in the year, the capacity can be cut down without requiring any change in speed or other alterations.

From 80 to 120 briquettes are made for each revolution, the number depending on the size and shape of the briquettes. These factors govern also the capacity, which ranges from 6 to 24½ tons per hour.

Mr. Schorr states that all wearing parts of the machine can be quickly and cheaply replaced. The lubricating is done by an air compressor and oil atomizer. The press is especially adapted for the manufacture of small briquettes, and the advantages of such in preference to large blocks are obvious. Small briquettes can be readily shoveled into furnaces, whereas the large ones have first to be broken up, thus causing labor, waste and dust.

A briquetting plant, of an entirely different type, designed by Charles R. Allen, was built and put into operation by him, during 1905, at Pittsburgh, at the junction of San Joaquin and Sacramento rivers, about 50 miles from San Francisco. This plant, as originally projected, was intended to utilize the sub-bituminous coal produced by the Pittsburgh Coal Mining Company at Somersville, but the

1. See *Eng. and Min. Jour.*, September 2, 1905.

enormous increase in the production of oil in California has had so demoralizing an effect on the coal trade generally that there has been little or no market for the coal during the last 2 years and the mines have been shut down. The material used has been screenings obtained from the coal yards of San Francisco, the binder here, as at other plants in the State, being asphaltic pitch. The screenings are sold at less than the cost of mining coal, and as long as the supply of this material is available at such prices it will continue to be used.

The methods of preparing the briquetting mixture differ somewhat from those used at other plants, in that the binder, together with the fuel, is passed through the retorts under a high degree of heat. This it is claimed insures an intimate and thorough mixture, each particle of fuel being impregnated with the binder. This treatment it is asserted prevents the binder from being consumed before the coal is ignited, which is apt to be the case, particularly with sub-bituminous coal, if the mixing is merely superficial. Mr. Allen claims that in his process the nature of the fuel is changed so that the sub-bituminous coal partakes of the character of bituminous coal, the briquettes remaining firm and hard until entirely consumed. He claims also that the process possesses as much of novelty and value as the press.

The compressing machine consists of two non-concentric rings horizontally placed one within the other, the periphery of the smaller one being corrugated, or scalloped, and engaging with similar corrugations in the inside of the larger ring. The briquetting mixture is fed into a hopper ¼ of a revolution of the smaller ring from the point of compression, and the amount of pressure is regulated by the distance of the feed from the point of compression; that is to say, the hopper may be placed farther away if a greater pressure is desired, or nearer if the pressure is to be reduced. Relief from an excess of pressure is provided for by two heavy spiral springs on the outer bearings and two over the upper pressure plate, the lower pressure plate being fixed. The machine has been operated without using any of the springs, with the result that when there was a surplus of feed the operating belt was thrown off through the choking of the machine.

Mr. Allen's invention is United States Patent No. 851,007. The briquettes as now made are approximately cylindrical in shape, with flat ends. They weigh from 8 to 10 ounces each and have a specific gravity of 1.14. It is Mr. Allen's intention to reduce the size of the briquette and change its shape by having the smaller ring of the press made without corrugations. This will be done in order to meet the demand for a briquette better adapted for domestic uses.

The plant is at present turning out about 5 tons of briquettes per hour, at a moderate running speed. With a smaller briquette the production per hour would be decreased with the same speed, but by increasing the speed the same production could be maintained. The Standard Coal Briquetting Company, of Oakland, constructed in 1905 a plant designed by a Mr. Crawford. An accident to the press shortly after being put in operation practically wrecked it and the enterprise was unsuccessful.

Another plant, beginning operations in 1905, used a small press of the plunger type, designed by A. Demetrak and built by the American Briquetting Company (afterwards reorganized as the Ajax Briquetting Company), of San Francisco. It was destroyed by the earthquake and fire of April, 1906, and has not been rebuilt. The plant had a capacity of about 15 tons a day, using sub-bituminous coal from Coos Bay, Ore., sometimes mixed with coal yard screenings and asphaltic pitch.

The United States Briquette Company, of Stege, Contra Costa county, has undertaken the manufacture of briquettes from a mixture of peat and California crude petroleum. This plant had not been completed at the time of writing this report, but some briquettes made of the mixture in an experimental way are interesting productions. They give promise of a method of using California oil as a domestic fuel, the peat on account of its spongy character acting as a carrying vehicle for the oil and at the same time performing duty as fuel. The briquettes are cubical in shape and of attractive appearance. They weigh about 10 ounces and have a specific gravity of 1.3. It is claimed that they are as well adapted for steam raising as for domestic purposes, giving an intense heat under forced draft and burning freely under ordinary draft; that they can be handled without waste from breakage, and that they leave a minimum amount of ash and do not clinker.

Arizona.—The Arizona Copper Company (Limited), of Clifton, Ariz., installed during 1905 a briquetting plant purchased from Yeadon, Son & Co., of Leeds, England. The plant was put into operation in September, 1905, and produced during the first 6 months of 1906, 690 short tons of briquettes having a total value of $4,830, or an average of $7 per ton. About 300 tons were produced in experimental runs in 1905. The plant was installed for the threefold purpose of utilizing coke breeze, which is without value and non-usable as such, of procuring better efficiency from the slack coal (Gallup, N. M.) which is used as fuel, and of obtaining a fuel that could be stored without material deterioration and without danger of spontaneous ignition. James Colquhoun, President of the Company, states that the economic advantages realized are from the first and third operations. By briquetting the coke fines or breeze a profit of about $4 per ton is made in the conversion of a material formerly wasted into a usable fuel. In using the Gallup slack, which is sub-bituminous coal ("black lignite"), the expense of briquetting brings the total cost up to approximately $6.80 per ton, or about the same as that of the lump coal obtained from the same source, although the price for the slack at the mines is very low compared with that of lump coal. The briquettes have been found to burn freely and satisfactorily under locomotive and stationary boilers, and appear to be equal to the best of Gallup lump coal, but no laboratory tests as to their calorific power have been made. The real profit in the briquetting of this coal lies in the superiority of the briquettes over lump coal for stacking purposes. They stand weathering perfectly, while the lump coal disintegrates on exposure, loses a portion of its combustible gases, and becomes in time a very inferior fuel. It is also liable to spontaneous combustion, which the briquettes are not. In making the briquettes 92 per cent. of the coal is mixed with 8 per cent. of California asphaltic pitch. The capacity of the plant is 2½ tons of briquettes per hour.

The following description of the plant at Clifton has been furnished by the Company. In design the press is similar to the one used by the Geological Survey fuel testing plant at St. Louis. This was designated the "English" machine, and has been described in the reports of those tests.[1]

The coal or coke fines are fed from the bins into the boot of a bucket elevator, which discharges them into the hopper at one end of a mixer, where it is mixed with pitch that has previously been broken in a pitch breaker into pieces of ¼ inch maximum size. The quantity of pitch found to give the best results is about 8 per cent. From the mixer the material is sent into a disintegrator, which thoroughly pulverizes the coal and pitch into grains of 2 mm. size or less. It is then elevated and passed into a heater, where it is subjected to the action of live steam, which gives the pitch sufficient fluidity to bind the other ingredients. From the heater the material drops into a pug mill, which, while stirring the mass, sweeps it into a false bottom. This false bottom is behind the disk of the briquetting machine, and at each revolution of the main shaft the material is rammed into a pair of compartments in the disk. The disk contains eight pairs of such compartments, and at the same time that a pair of briquettes is being rammed into the disk on one side another pair is being compressed on the opposite side, while a third pair is being pushed out from the top of the disk on to an endless belt conveyor, which delivers the briquettes to the side of a railroad car in front of the building. The briquette disk is made to revolve intermittently in 8 periods to each complete revolution. During the pause in each period the three operations referred to take place simultaneously.

The capacity of the plant is 25 tons per 10 hours. It is arranged to mix 3 ingredients into material for briquettes, but at present only coal or coke fines and pitch are used. The briquettes are rectangular in shape and weigh approximately 4 pounds each.

Michigan.—The Semet-Solvay Company, of Syracuse, N. Y., has recently completed the construction of a briquetting plant at Del Ray, Mich., to be operated in connection with the by-product coking ovens and chemical works installed there several years ago by the same Company. The installation of the briquetting plant was begun about 2½ years ago. As originally constructed the briquetting machine was a reciprocating press of English make, but after carefully working out the process the Company came to the conclusion that a press of the reciprocating type is adapted only to large briquettes, whereas the domestic trade of the city of Detroit, for which this product was intended, demands a small briquette. As the result of the experience gained with the English machine, the Company has developed a process for the manufacture of small briquettes, and, although this plant is just beginning operations, it gives excellent promise.

The process consists essentially of the intimate mixing of finely powdered pitch of proper quality and consistency with pulverized coal, so that theoretically each particle of coal is coated with the fine pitch. The mixture is then brought up to the proper temperature with steam, or steam and hot water, and is fed to a rotary Mashek press built by

1. Bull. U. S. Geol. Survey No. 261, and Prof. Paper No. 48, 1906.

the Traylor Engineering Company, of New York. The output of the plant is from 10 to 15 tons of briquettes per hour. They are from 2½ to 3 ounces in weight, and about 1¾ inches square, shaped somewhat like a miniature sofa pillow. This shape is satisfactory for shoveling and for handling in household stoves and furnaces. The Company is using a portion of coke breeze with the coal and pitch with a view of utilizing the breeze from its coke plant, and it is also experimenting on the best mixtures and the best grades of coal. The briquettes made so far are said to burn well and to give no smoke except a slight puff when they are first thrown on the fire. As the plant is not yet in full operation, some minor adjustments are still being made to perfect the product, but the operators are much encouraged by results so far obtained, and expect within a short time to be making a thoroughly satisfactory commercial product.

North Dakota.—During 1905 ex-United States Senator W. D. Washburn, President of the Washburn Lignite Coal Company, erected a small plant at Minneapolis, Minn., for experimental work in briquetting North Dakota lignite. The plant was too small to be operated successfully from a commercial standpoint. Several hundred tons of briquettes were made without the use of a binder. They proved a satisfactory fuel for domestic purposes and for stationary boilers, but were not adapted to locomotive use, as the heavy exhaust draft in the locomotive has the effect of disintegrating the briquette before combustion and causes the throwing off of large sparks.

Robert L. Stewart, also of Minneapolis, who is interested in lignite properties near Kenmare, Ward county, N. D., reports that he has been conducting a series of experiments with a view to briquetting this fuel, and as a result of his investigations the American Briquetting and Manufacturing Company has been organized. This Company contemplates constructing during the present year a briquetting plant in North Dakota, convenient to the lignite deposits, and having a capacity of 1,000 tons of briquettes per day. Mr. Stewart states that the briquettes can be manufactured at a cost not to exceed $2 per ton f.o.b., this cost including the expense of mining the lignite and delivering it to the briquetting plant.

Texas.—Three companies have been organized recently in Texas for the purpose of briquetting lignite, which occurs in great abundance through the eastern part of that State. These are the International Compress Coal Company, of Houston; the American Lignite Briquette Company, of San Antonio; and the Ureka Briquette Company, of Rockdale. The plant of the Eureka Company has been erected and is ready for operation at the time of writing this report, except for the fact that the drying apparatus has been found too small and the plant has been shut down pending the erection of a larger drier. The details of the plant have not been obtained.

The American Lignite Briquette Company, while incorporated at San Antonio, will locate its plant at Rockdale, to be operated in connection with the lignite mines of J. J. Olsen & Son. The Company has purchased a press made by the Klein Briquette Company, of St. Louis, Mo., and the plant will probably be in operation by the time this report is ready for distribution.

The International Compress Coal Company has been negotiating for the construction of a plant, but no actual building had been begun at the time of writing this report. All these plants expect to use asphaltic pitch from heavy Texas oil.

Florida.—In September, 1905, the Orlando Water and Light Company, of Orlando, Fla., completed the installation of a plant for the treatment and briquetting of peat, which occurs abundantly in the low-lying lands of Florida. The plant is located about 3 miles from Orlando, on the border of a peat bog from which its supply is drawn. as originally installed, this plant consisted of a macerating machine or pug mill, in which the fiber of the peat is entirely destroyed, and a brick press. The briquettes as they came from the press were about the size of an ordinary building brick, but when dried in the sun shrunk to about one-fourth their former bulk and lost from 75 to 85 per cent. in weight. The briquetting feature of the plant was abandoned in the summer of 1906, as it was found that this part of the work represented 75 per cent. of the total cost, and that a satisfactory fuel could be made without briquetting. The method of treatment at the present consists simply of "machining" the peat in the pug mill and dumping it in masses of several hundred tons. As the peat dries it shrinks and cracks into large, irregularly rectangular blocks, which are broken off from the heap and stored. When thoroughly dried, these blocks make a good hard fuel, which it is stated may be used for both locomotive and stationary boilers, for household purposes, and for the manufacture of gas. Tests of the machined peat for producer gas at the Geological Survey fuel testing plant gave excellent results.[1]

The machine used at the Orlando plant was built by the Moore and Wyman Elevator and Machine Works, South Boston, Mass., under patents issued to the late T. H. Leavitt, of Boston.

Missouri.—During the summer of 1903 Gov. W. C. Renfrow, of Oklahoma, became financially interested in a briquetting company in St. Louis. In the fall of the same year E. D. Mizner, of Hamilton, Ontario, visited St. Louis to make a report for some Canadian interests relative to the purchase of the Canadian rights for the patents of this company. The results of these investigations, and the efforts of Governor Renfrow to force the briquette Company to deliver a machine, ended in the bankruptcy of the Company. In October, 1903, an agreement was made between Governor Renfrow and Mr. Mizner by which Mr. Mizner was to build a briquette machine which would overcome the difficulties encountered with the other press. No company was organized at that time, but contracts were drawn satisfactory to the people interested.

The following spring Mr. Mizner built the first Renfrow press, which made briquettes 2 inches in diameter, weighing about 4 ounces. This press had some of the essential features of the original Renfrow press, but made briquettes only at one end of the stroke—that is, 12 briquettes per revolution. After this machine was built it was discovered that the briquettes were too small and that the construction of the machine was too light. Mr. Mizner also developed the idea of making briquettes at both ends of the stroke, thus doubling the capacity of the machine. It was decided to build a much heavier machine, making a briquette 3 inches in diameter. Changes were also made in the method of mixing and heating the material. The cast iron vertical heaters of the original press were supplanted with horizontal jacketed heaters, using ordinary spiral conveyor flights for mixing and handling the fuel. To this was added a short vertical heater, acting as a reservoir into which live steam was admitted just before the mixture was delivered to the molds.

This machine was completed in the fall of 1905. C. T. Malcolmson, of the Geological Survey testing plant,[2] inspected this press at the shops of the Ramming Machine Company, at St. Louis, and burned some of the briquettes under a boiler at that plant. Difficulties were developed from the fact that the fuel remained too long in the vertical heaters, and some trouble was also experienced in getting the material from the die filler to the die proper. Occasionally briquettes would stick in the dies, resulting in a double charge, which finally crippled the machine. Provision was then made to overcome these difficulties and the machine was rebuilt. The new machine was first tested in March, 1906. The heating capacity was increased so that the charge remained in the conveyors about 15 minutes before reaching the dies, thus allowing the material to become thoroughly heated and the melted pitch to mix with the coal. Brushes were added to insure the charge being carried to its proper position in front of the die, and an ejector, operated by a magnet, effected the delivery of the briquettes from the ends of the plungers. Many of the parts of the machine were strengthened and steel and bronze were substituted for cast iron in the wearing parts. The results of the tests on this machine made under the supervision of Mr. Malcolmson for J. A. Holmes, expert in charge of the Geological Survey fuel testing plant, at the Company's testing plant, resulted in a contract for the rental of this machine by the Government. In May, 1906, the first successfully operating Renfrow machine was installed at the fuel testing plant.

The results of the tests made on the Renfrow machine from May, 1906, to March, 1907, indicated that the design of this press was, in the main, satisfactory, and that the difficulties experienced were due almost entirely to bad or weak construction of the machine. This machine was the result of many changes, and it was impossible to strengthen some of the weak parts owing to the limited space, or to the fact that the size of the part was fixed by the original design.

The difficulties encountered in operating this machine at the fuel testing plant soon indicated its weaknesses, and as a result the Renfrow Company designed and built two new presses, one of which was installed and is now being operated by the Western Coalette Fuel Company at Kansas City. The other is now ready for delivery to

1. Campbell, M. R., Peat: Mineral Resources U. S. for 1905, U. S. Geol. Survey, 1907, p. 1310.

2. The briquetting portion of the Geological Survey coal testing plant at St. Louis during the exposition has already been described in Bulls. Nos. 261 and 290, and Prof. Paper No. 48. After the close of the exposition the American machine, installed by the National Compressed Fuel Company, of Chicago, was removed, and early in 1906 the remaining portion of the briquetting plant was destroyed by fire. In rebuilding the plant provision was made for the installation of a Renfrow briquette machine.

the Government fuel testing plant at the Jamestown Exposition. The new press makes a briquette 3¼ inches in diameter, weighing about a pound. The machine which was operated at the St. Louis fuel testing plant could not be depended on to deliver more than 1,000 pounds pressure per square inch on the briquettes without seriously straining the frame of the press. The new machine will deliver a maximum pressure of about 2,500 pounds per square inch without straining. All the wearing parts not under pressure are made of bronze, so as to prevent corrosion; the dies are made of case hardened steel and, owing to the abrasive action of the fuel, are kept clean and bright. The cams and rollers, which were originally made of chilled cast iron, are in the new machine made of case hardened tool steel, and the design of the housing has been so changed that any of the parts can be removed without dismantling the machine. Provision has also been made to so feed the heaters that they will always run clean and at the same time keep a full load in the chamber above the die filler. This chamber, closed in the old machine, is open in the new, thus allowing the operator to regulate the supply of fuel to the press at all times. The plungers are arranged so as to make it practically impossible for a double charge to enter the press, and the length of the spring behind the plungers has been increased so that a double charge would not affect the press in any way.

Early in 1906 the Renfrow Briquette Machine Company was incorporated under the laws of the State of Missouri, with a capital of $1,000,000. W. C. Renfrow is President, J. M. Smith, Secretary and Treasurer, and E. D. Mizner Superintendent, and it is a close corporation. The Company will not offer for sale any machines until after the Kansas City plant has proved successful. So far as can be learned, the construction of the Kansas City plant was brought about by the willingness of J. H. Durkee, President of the Western Coalette Fuel Company, to accept a Renfrow machine without a guaranty, simply on the strength of the work done at the fuel testing plant. There are still, of course, some difficulties to be overcome, as is the case in the operation of any new plant, but in the main the mechanical operations of this plant are satisfactory, and the Renfrow Company has been able to deliver what it contracted to deliver. Financial difficulties have threatened the life of the plant under the present organization, but Governor Renfrow has stated that he will not allow this plant to fail for this reason. A contract has been signed to deliver one of the machines to a company at Detroit, but under the terms of the contract no date is fixed for the delivery of this machine, and no guaranty from the Renfrow Company has been required. Governor Renfrow is also authority for the statement that the Detroit machine will not be delivered until after the Kansas City plant has been successfully operated and put on a commercial basis.

The Renfrow Briquette Machine Company has no plant of its own, but has under serious consideration the establishment of a factory at St. Louis. All the machines above mentioned were built by machine shops under contract. The Kansas City machine was built by the Excelsior Tool and Machine Company at East St. Louis, and the other machines by the Ramming Machine Company, of St. Louis.

The cost of manufacture of briquettes at one of the plants in the State of New York, is as follows:

Pitch.

Six per cent. of pitch, at $10 per ton	$0.60
Deducting for increased weight of product due to pitch, calculating product at $5 per ton	.30
Net cost of pitch	$0.30

Fuel.

For boiler, broken coal and screenings, broken briquettes, 4 tons per day of 10 hours, at $2.50 per ton = $10; per ton of briquettes	0.10
For heaters, driers and pitch melting, 3 tons, at $2.50 per ton = $7.50; per ton of briquettes	0.075

Labor.

	Per Day.		Per Day.
1 foreman	$5.00	1 man on ground floor	$1.75
2 pitch melters	3.50	1 night watchman	1.75
1 dust-bin man	1.75	1 oiler	1.75
1 engineer	3.50		
1 man on second floor	1.75		$20.75
Per ton of briquettes			0.21

Miscellaneous.

Wear and tear per ton of briquettes	$0.10
Lubricating oil per ton of briquettes	0.01
Insurance per ton of briquettes	0.005
Interest on capital invested—$40,000 at 6 per cent	0.10
Office expenses, telephone, stenographer and stationery—$2,000 per annum	$0.09
	$0.99
Anthracite dust at $1.40 per long ton, per net ton of briquettes.	1.25
Total cost of briquetting	$2.24
Rebriquetting 3 per cent. of breakage and abrasion, charging it back to plant as dust, per ton of briquettes	0.06
Net cost of ton of briquettes	$2.30
Wholesale selling price in bin	4.80
Net profit per short ton.	$2.50

A New Recording Draught Gauge.

Engineering notes that the Cambridge (England) Scientific Instrument Company has brought out a recording draught gauge which embodies a very meritorious principle, and is of a type of registering instrument which the engineer has learned to appreciate. While the practical engineer still retains more confidence in hand than in automatic stoking, he also recognizes that the stoker should be provided with instruments which tell him at a glance how his furnaces are working. So far as possible he has to keep his fires under direct observation, and two types of instruments will further inform him whether the combustion is proceeding at the desired rate. The first of these is a carbon dioxide recorder, which draws a continuous curve of the amount of CO_2 in the boiler flues or waste gas flues. Although the system of glass tubes and vessels of the ordinary apparatus, in which the carbon dioxide is absorbed by means of caustic potash, looks a little complicated, the benefits of these apparatus are generally acknowledged. The second instrument is the indispensable supplement of the first, inasmuch as it records the draught. If the engineer conld rely upon always having the same grade of fuel, and if he worked always under the same conditions, one of the two instruments might do, and he would then probably prefer the more simple draught recorder, which does not require any attendance at all.

The instrument of the Cambridge Scientific Instrument Company records continuously the suction of a chimney or a flue, measured in inches of water. One of these instruments was recently supplied to Messrs. Babcock & Wilcox for the Rand Water Board. Fig. 1 is a

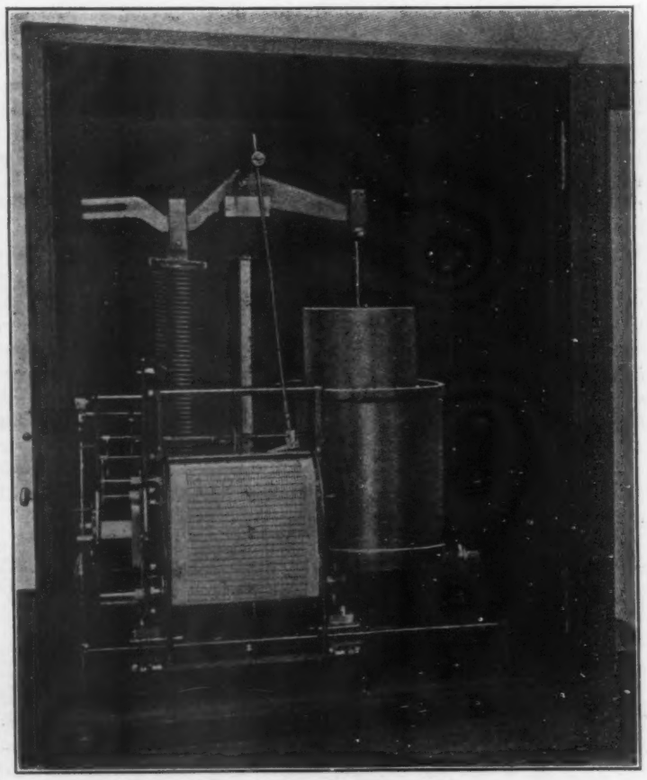

Fig. 1.

photograph of the instrument in its glass case, whose glass door, open in the view, would normally be kept closed, of course. Fig. 2 shows

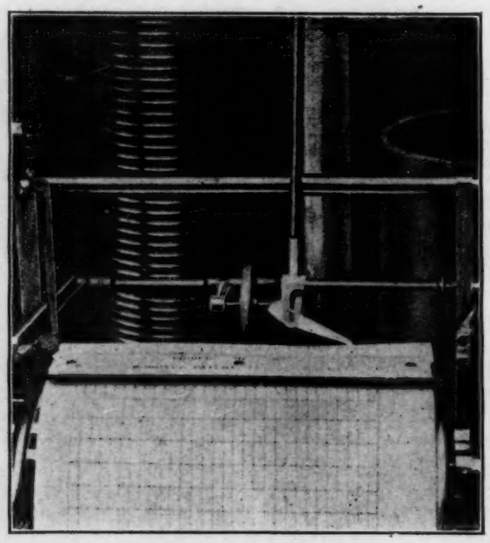

Fig. 2.

details of the Murday patent pen movement which the Cambridge Instrument Company has found convenient and reliable. Practically the instrument is a balance, in which the suction effect of the draught on a bell is opposed by the action of a helical spring. A lead pipe connected to the chimney is joined to the recorder by means of a union coupling, and communication is thus established between the chimney and the inside of a metal bell, whose mouth is sealed by dipping into the oil contained in an outer vessel. The stronger the suction the more the bell will be depressed. A helical spring pulls downward at the other end of the beam. A pointer is carried downward from the axis of the beam, moving to the left when the suction is increasing, and to the right when the draught is going down. The lower extremity of the pointer, and the pen attached to it, would thus describe an arc on the drum. The Murday movement, however, causes the pen to travel to and fro in a straight line, and a straight line would be drawn on the paper if the drum were not moved by clockwork. The pen, as shown in Fig. 2, is supported by means of a knife-edge bearing in a fitting, carried at the extremity of the pointer. This fitting slides along a horizontal bar, and when the end of the pointer is raised, owing to its being deflected and describing an arc, the pen itself will always bear upon the paper.

The movement of the pen across the paper is rather more than 1 inch for a change of 1 inch head of water in the chimney suction. The range of variation provided for is 3 inches head of water, and the instrument can readily be modified, so that the actual values recorded extend from zero to 3 inches, or from 0.5 inch to 3.5 inch, or from 1 inch to 4 inches. Weights are supplied suitable for attachment at the forked end of the beam, projecting in Fig. 1 to the left of the upper end of the helical spring; by means of these weights the scale of suction values can be raised by either ½ inch or 1 inch head of water. The paper on which the records are made is ruled with blue vertical lines corresponding to 0.1 inch head of water, and with a further set of red transverse lines corresponding to every quarter of an hour. A scale carried above the surface of the paper is divided in a similar manner. The paper is supplied in continuous rolls, each containing enough for at least a fortnight's continuous work. The clockwork also runs for a fortnight, and during this period the instrument will not claim any attention.

Notes on Resistance of Gas Pipe Grounds.[1]

[A paper read by Mr. J. L. R. Hayden, at the last meeting Am. Inst. Elec. Engineers.]

Earth connections in electric circuits are frequently made by driving a gas pipe into the ground. Such grounds are of fairly high resistance, and therefore not permissible where a low resistance ground is required. Their great simplicity and cheapness make them desirable, where very low ground resistance is not necessary, as for discharging static charges, earthing overhead ground wires, etc. To get data on the resistance offered by such gas pipe grounds, their permanence, and the variation of the resistance with the seasons, an investigation was started 2 years ago.

1. Reprinted from the "Proceedings" of the Institute; March, 1908.

Three gas pipes of 2.5 inches diameter were driven into the ground at distances of 15.75 feet between *I* and *II*, and 7.4 feet between *II* and *III*, in the lawn adjacent to Dr. Steinmetz's laboratory. The soil is a clay loam, overlaying shale rock a few feet below the surface. The pipes are driven into the following depth:

I. 3.75 feet. II. 2.75 feet. III. 3.10 feet.

The resistance of the 3 grounds was measured with an alternating 60-cycle current of 120 volts, and as return ground was used the system of the city water pipes. This return ground showed to be less than 0.01 ohm. It was therefore neglected.

Readings were taken at irregular intervals from August, 1905, to August, 1906, and daily from September 1, 1906 to date; during fall and spring, morning and evening readings were taken to see whether the daily temperature variation had any effects. These, however, were found so small that in the attached curves the daily average has been used.

Fig. 1 shows the variation of the three ground resistances during

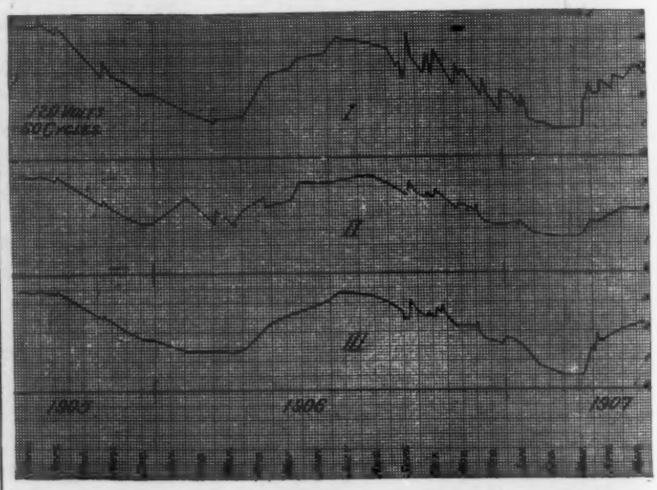

Fig. 1.

the whole period, and Figs. 2 and 3 the variation from September, 1906 to date, in larger scale, so as to show the daily values. The values are given in amperes at 120 volts 60 cycles, and so are proportional to the conductivity.

The lower curve gives the daily average of temperature, and the rain fall, the height of the black line gives approximately the intensity of the rainfall.

The curves show very plainly the sudden rise of conductivity at rainfall, and the gradual decrease during the following dry period. The maximum of conductivity occurs in July and August. This was rather unexpected, since the wet season is in spring. It seems that the increase of conductivity of the moisture at high summer temperature amounts to more than the increase of moisture during the wet but cooler spring season.

The minimum of conductivity is towards the end of March. Since thunder storms occasionally occur before this period, this feature requires serious consideration. So far the values of the present year approximately repeat last year's record, except in winter; during the last winter the conductivity decreased to very much lower values than in the previous winter. Whether this was due to the greater severity of the last winter must remain for further investigation.

Interesting is the great difference between the 3 grounds, although closely adjacent to another. Ground *I* shows the effect of rainfall and dry periods very much more than *II* and *III*. *II* and *III* during summer are very closely the same, while *I* has a considerably higher conductivity, about 30 per cent. From October onward the conductivity goes down, and towards the end of December, *II* and *III*, which until then were very closely alike, begin to differ; *III* decreasing much more rapidly, to a minimum in March, of less than 0.5 ampere or less than one-sixth of the summer value, while *II* reaches a minimum of 1.15 amperes or about one-third of the summer value, and *I*, which has been of higher conductivity during summer, falls below *II* towards the end of January, reaching a minimum of 0.9 ampere. Towards the end of March all three grounds rapidly rise in conductivity; with the spring thaw, in the beginning of April, *II* and *III* are again alike, and *I* of higher conductivity than the other two.

It seems herefrom that such gas pipe grounds are permanent for at

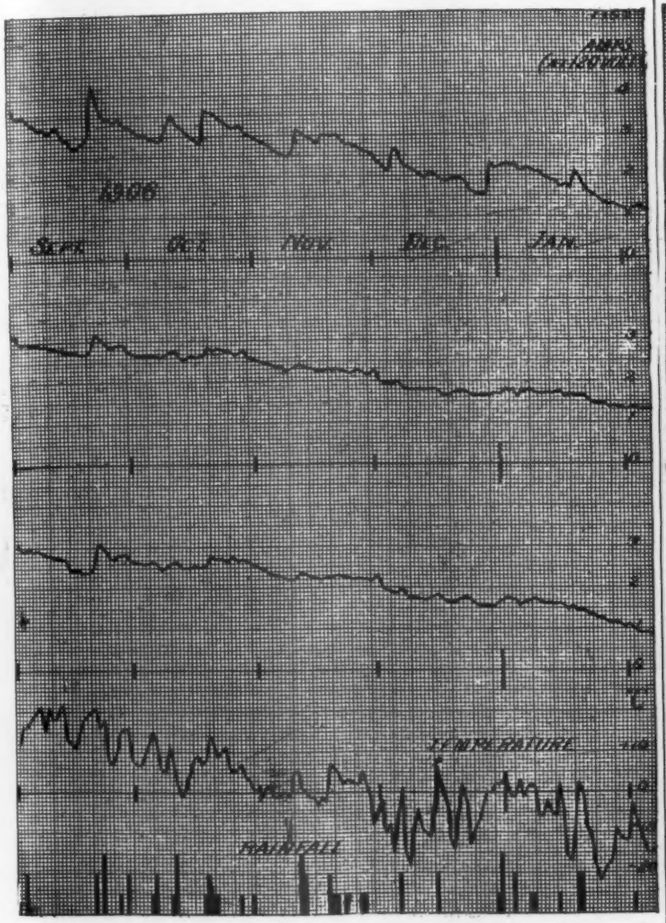

Fig. 2.

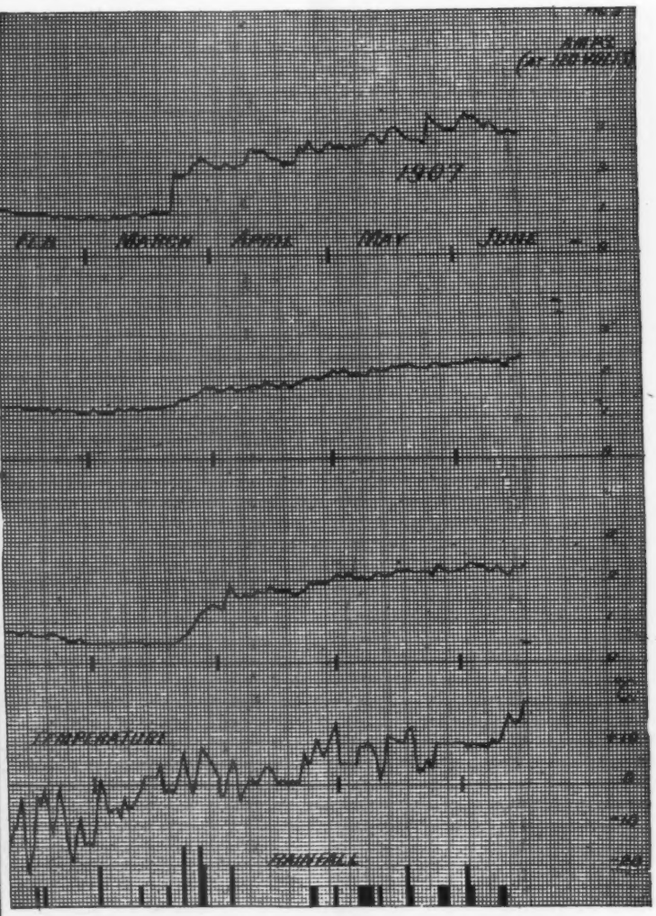

Fig. 3.

least some years, but show a marked annual variation, the conductivity greatly decreasing during winter. But, against expectations, even at the winter minimum, a very appreciable conductivity is left. The most important conclusion is, however, that such grounds show very great individual difference in their annual variation, even when closely adjacent to each other. This matter requires a further and more extended investigation, which has been started and will be reported upon at a future time.

An interesting and useful feature observed was that by the passage of an alternating current through the pipe into the ground, the conductivity gradually increased, for instance:

Circuit Closed at Noon.

0 hours after	.....	3.40	amperes at	120 volts.
7 " "	.....	3.90	"	"
9 " "	.....	4.33	"	"
22 " "	.....	4.42	"	"
43 " "	.....	4.50	"	"
52 " "	.....	4.69	"	"
75 " "	.....	4.78	"	"
103 " "	.....	4.74	"	"
120 " "	.....	4.73	"	"

Circuit Opened at Noon.

0 hours after	.....	4.73	amperes at	120 volts.
7 "	.....	4.02	"	"
23 "	.....	3.62	"	"

Appendix.

As the daily measurements of the gas pipe grounds have been continued during the time which has elapsed since the reading of the above paper, in Fig. 4 the record of Fig. 1 is continued to the middle of February, 1908. As seen, the curves as in Fig. 4 show the same characteristics and the same values as in Fig. 1: *I* gives a higher summer maximum, and a far greater variation of the conductance with the rainfall; *II* and *III* are practically alike until the arrival of very cold weather, which this year occurred at the end of January, when *III* went far down below *II* in conductance, just as it did in former years.

It seems, herefrom, that at least during the period of observation, of nearly 3 years, the gas pipe grounds showed no permanent change, but merely periodic variations with the seasons of the year.

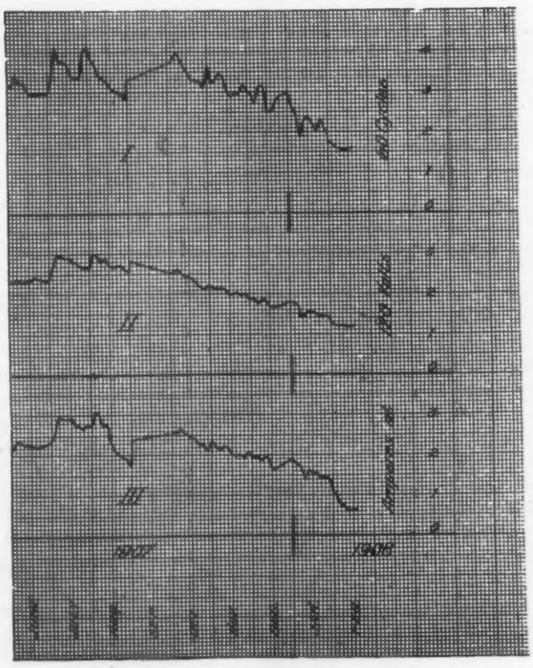

Fig. 4.

Discussion.

Mr. Chas. P. Steinmetz—It seems that the continuous passage of an alternating current through such a gas pipe to the ground increases the conductivity. This test of increase of conductivity was made in the summer time. It stands to reason that during winter the increase will be very much more because of the melting ice. The curves given in the paper show interestingly how towards the winter the conductivity gradually falls and reaches the minimum; towards the

end of March and then very suddenly jumps up. It also shows many times after a rainfall a sudden rise of current which gradually fades out, and how all three grounds go together until the end of the year and then the one current becomes very small, while the other is still high, and the low resistance ground has reached a higher resistance than one of the high resistance grounds. This is only a preliminary report, but it is interesting to know that such a gas pipe ground, which has been called bad names for a long time, seems to remain a ground even in winter when everything is frozen, even if it does not come below the frost line. It is naturally not good enough to discharge a large current, but is good enough to dissipate all electrostatic discharges which may accumulate in the line. It remains to be investigated whether grounds in different places, different soils, etc., may not give still greater values and show different results.

Mr. Ralph D. Mershon—Why not extend these investigations to other forms of ground? Why not compare pipes with some of the other forms of ground.

Mr. Chas. P. Steinmetz—That is what Mr. Hayden is arranging to do, to start an investigation on a larger scale. There have been a number of suggestions already made, in connection with gas pipe grounds, of filling the hole up with coke and salt and other materials. It remains to be investigated, whether there is any benefit in digging a hole and filling it with coke, or whether driving a pipe into the ground is not nearly as good. Another question is as to how the character of the surroundings affect the ground, whether to drive the ground pipe in the middle of a road or to drive it under trees. We are putting down a large number of these gas pipes scattered over the college ground at Schenectady, and expect to get further results from these tests.

Mr. F. B. H. Paine—Do I understand that the gas pipe introduced farthest into the earth has the least resistance?

Mr. Chas. P. Steinmetz—The least resistance, or highest conductivity in summer, but in winter it falls in conductivity below the one which was less deep. The shallowest one showed the best conductivity in winter, more than twice the conductivity of the other one, which was a little deeper, and nearly twice the conductivity of the one which was deepest. We measured at lower voltages by putting high resistance in series; instead of 120 volts, 40 or 50 volts gave the same resistance.

Mr. P. H. Thomas—If you had 100 amperes it might be different?

Mr. Chas. P. Steinmetz—The resistance would probably go down, due to the heating, and so it would show the time effect. Perhaps with high voltages and extremely large currents, but with a range of 120 volts or less, the resistance would be constant.

Mr. Ralph D. Mershon—We made a somewhat similar investigation. The railway companies were very particular about having our structures grounded near the tracks, and they designed some elaborate grounds, groups of steel rails surrounded with coke. Mr. Nicholson made some measurements on the concrete tower foundations and also the resistance of some of these grounds. First he tried to use a Wheatstone bridge, but the stray currents from different places in the country bothered him. Then he used a modified Wheatstone arrangement in which you make use of the stray current to measure the resistance. He got results which were concordant, but he found that with a voltmeter he could always get a voltage sometimes in one direction and sometimes in the other, between the tower and a pipe driven in the ground. Then he drove two exactly similar pipes in the ground, to the same depth, and got a voltage between them. Then he put two pipes in a barrel of water and got a voltage between, and he found he could reverse the voltage by the amount of immersion of the pipe.

Mr. F. B. H. Paine—It is my recollection that the same foundation resistances were measured at different times in the year, but certainly during the summer and fall, but I think later on in the winter the variation in resistance was so slight as to be comparatively negligible; it varied between 7 and 10, and 7 and 12 ohms, at different times of the year, the same foundation, not more than that.

Mr. N. J. Neall—What is the ohmic resistance of the concrete foundations under the tower?

Mr. Ralph D. Mershon—The highest is 20 ohms, and the lowest is 3 ohms from the tower to the ground. These values were got by measuring the resistance between the two adjacent towers and assuming that half the resistance was in each one. I think there is room for further investigation in regard to these grounds, not only as to the ohmic resistance, but as to the part they play in case of surges.

Mr. Chas. P. Steinmetz—We are going to try to measure not only with 60-cycle current, but also with the high frequency current, 100,000 cycles.

Mr. Ralph D. Mershon—I got one railway company to allow me to dig a trench and put in a strip of copper—they finally agreed to let me put in galvanized iron—with some coke around it to make a good contact with the ground.

Mr. Chas. P. Steinmetz—Mr. E. J. Berg some years ago proposed to run a shallow ditch along the line and run an underground wire in the ditch and connect that up with the overhead ground wire and use it as an energy dissipating wire, instead of the ground.

Workmen's Rewards for Suggestions.

Iron Age editorially notes that a writer in one of the English engineering journals, in discussing the relations of producer and user in the development of machinery, makes this statement: "Many workmen, especially where their observation is suitably encouraged, are as likely to contribute to efficiency of design as draftsmen; their experience is direct, practical and intimate. No reading of a drawing, however perfect, can compare with the constant study of the actual machine in operation, or of the growth of any given product. Some trained mechanics have considerable capacity for reflection, and then, during machinery operations, ideas are more likely to develop than in the case with draftsmen isolated from manufacturing processes. This must materially affect those parts in the design which are influenced by machining operations, and which undoubtedly affect not only economy of manufacturing, but of the accessibility of parts of the product."

We believe that in most American industrial establishments the workman is given little substantial encouragement to apply his mind toward improvements in the design of machinery and processes. To carry out such a plan is no easy proposition. A few works have adopted elaborate systems of premiums for ideas, either on a competitive basis, or on one in which the worth of the suggestion determines the reward. But in the ordinary manufacturing plant this form of encouragement of a workman is not a simple matter. If he is an operative, his worth must be reckoned on his producing capacity rather than on an occasional suggestion that the drafting room will work up later. His invention of an improvement on a machine tool would not necessarily justify an advance in his wages; in fact, in many cases it would really afford no ground for it. Perhaps a money reward, an unsolicited present, in recognition of a valuable idea, would be as potent a stimulus as anything. The personal equation of the workman would always be important in this connection; there are plenty of men who spoil easily under praise or reward, and their notion of their own worth increases out of proportion to reality. It is easy to imagine a capable workman whose value has been actually impaired because of exaggerated egotism wrought by the finding of an extra banknote in his pay envelope. In some shops the existence of labor complications might render such a practice unwise. The likelihood of engendering jealousy is another consideration. Then, again, the employer may feel that suggestions constitute a part of the work for which his men are paid, and that their reward lies in their wages.

On the other hand, it is not at all uncommon to hear of the complaint of a workman that no recognition has been taken of a suggestion, the value of which has been evidenced by its adoption. He feels hurt; he has not been appreciated; the drafting room has taken credit for his idea; he should have some return for the value received from him. The next time he has an idea he may keep it to himself. He may become a less valuable man than he would have been if the idea had not entered his brain.

It is an undisputed fact that few machines are designed on paper that do not require radical changes from their first model. And the design of no machine, no matter how perfect, can be permitted to stand still. Constant improvement must be made in order to meet competition.

The English writer states that the man operating a machine is in the best position of all to see opportunities for improvement. Probably, however, the most efficient man in this connection would be the trained designer who takes the time to act as an operator under commercial conditions. This idea is carried out to a certain extent. The designer spends as much time as possible in the shop, keeping in close touch with the machine upon the improvement of which he is working. He should have full knowledge of the criticism of customers and the weaknesses which result in excessive repairs, and with im-

provements in competing machines. In most modern establishments special pains are taken that this knowledge is provided. There is a growing tendency to give the engineer a practical knowledge of his specialty in its operation. As an illustration of this, some foreign ship builders are sending young engineers, and occasionally an expert, on cruises, that they may study various questions under service conditions. The drafting room is recruiting from the shop whenever genius for design is shown by young mechanics, and such a man has advantages over his associates who are trained exclusively at the drawing board and in the books. But no matter how skillful the machine designer, no matter what pains he may take to study his subject, or what his training has been, the mechanic in the home shop or that of some other user of the tool will continue to give valuable suggestion in design, and to encourage him judiciously may mean the realization of important advantages over competitors.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, Mar. 10th, 1908.

Slot Meter Robberies.—Mr. Newbigging Gives a Caution.—The Cost of Coal.

Naturally the increase in the number of unofficial collectors who fail to account at the office for the takings, to which attention was directed last month, has attracted some notice in our technical press, and several communications on the subject are forthcoming. The principal points elicited are the importance of short period collections, and of bringing in unused meters. The best deterrent to the slot meter thief is the knowledge that the plunder will be trifling, because after all the profession cannot be conducted without a considerable amount of risk. The universal practice in England is to make up the gas accounts quarterly. In some few cases weekly or monthly collections have been applied, but now that gas, instead of being a luxury for the well-to-do, is a necessity for all, it is evident that our ideas as to the number of meter readings in a year may well be revised. The quarterly system was applied to the slot meters in the first instance, but as soon as a considerable number came into use, it was observed that the sum of money locked up in this department was sufficient to pay for more frequent clearance, and therefore two or three rounds in the quarter came to be the recognized thing. Something, of course, turns upon the quantity consumed. Common sense suggests that when 5s. or so has accumulated in the till, the sooner it is transferred to the companies' coffers the better for all parties concerned. One gentleman is enthusiastic on fortnightly collections, and claims that they do not increase the working costs. But it is obvious that the expenses must be proportioned to the number of visits. In many districts the average of 26 visits in the year would be too small or seem to be worth collection. The practice may well be guided by the average taking per visit, rather than by any arbitrary period of time.

But there is another point in favor of fortnightly collections, and that is the additional facility for the registration of changes. Many of the customers are on weekly tenancies, and are given to sudden removals at a week's notice. They will not trouble to give notice at the gas office when they come, or when they go. If they find a slot meter on the premises they continue using it. For several reasons it is desirable to keep an accurate registration, and to get a signed agreement for each user. The agreement carries a certain moral effect, and regulations that can be acted on if necessary; but it is absurd to attach very much value to an agreement undertaking all sorts of obligations and penalties, if the same is signed by a gentleman who never owned £5 in his life, either in cash or in goods, and is never likely to be worth as much at any future time. A particular feature in this connection is the avoidance of waste or idle material. The proper place for meters or appliances that are out of use is the gas works store, and not an empty house, or premises occupied by some person who does not use gas.

Another thing is the importance of immediate attention to locked up houses, either by reason of their being unoccupied, or the tenant being away. These are, of course, the especial objects of attention on the part of a slot meter thief. The regular inspector is under the necessity of clearing a fair number of boxes on each daily round, and therefore cannot waste time waiting about or hunting after the landlord. In the absence of special arrangements a good proportion will be left till next time. A very pertinent suggestion is that a list of all boxes not cleared should be handed in daily, and should receive the immediate attention of a special official provided with a good bicycle.

Mr. Thomas Newbigging appeared before the Manchester Institution, a few days since, with a word of caution that, although ostensibly addressed to his fellow members, applies to a much larger circle, and is very much needed. Mr. Newbigging's advice is: "Do not be pressingly anxious just yet to bring about the millennium by reducing the illuminating power of your gas * * *. The day may come when a non-illuminating gas will be the universal vogue, but the day is not yet arrived."

There are several reasons why this advice should be carefully considered, at the present time, when the coal gas industry has to contend with all sorts of competition, such as suction gas, petroleum gas, acetylene, electricity, etc. The safest way under such circumstances is to see that no occasion for the enemy to blaspheme is afforded by the quality of the gas. There is no doubt but that the incandescent burner has to a large extent replaced the flat flame. Mr. Newbigging maintains that the older make of burner still has a very respectable following. Indeed it would appear from one of the paragraphs of his short paper that the Welsbach burner is not so extensively used in the north as it is in the south of England. But allowing that the flat flame is an unimportant minority, and that photometrical value is nothing more than a name to the customers, so long as the position occupied by the photometer is that of the legal testing instrument, there is no sense in calling it obsolete. The time to do that will be after it has been struck out of our special acts, and replaced by the calorimeter or some other more approved and up-to-date test. The consumer wants heating value, but we must not forget that the photometer is an indirect test of this quality, seeing that photometrical value cannot be reduced without also reducing (though not necessarily in the same proposition) the calorimetrical value. There is no need for concealing the fact that such reducing schemes all partake of the character of watering the whiskey. Users of gas rated at 600 B.T.U., if they have any common sense at all, can soon discern, by their accounts and otherwise, if a drop is made to 500, and they are more likely to appreciate the loss of quality, than a reduction in price, even if of more than proportionate value.

Admitting that there is no need to be particular about the indications of the photometer, it is more necessary than ever to give good calorimetrical value, and, therefore, I cannot agree that the gas of the future will be a cheap, 10-candle, 500 B.T.U. article, which costs as much to store, distribute, measure and sell, as a gas of superior quality. I look more in the direction of a gas containing 95 per cent. of methane and giving 900 B.T.U. or so. That is the article that will enable us to hold our own in spite of numerous competitors. I regard this consideration as more important than the interests of the small and continually decreasing proportion who for various reasons prefer to retain the flat flame burner.

All users of coal, and especially those who use larger quantities in proportion to their income than gas companies, are watching with some degree of interest, not to say anxiety, the proceedings of Parliament in respect to a bill now under consideration, having for its effect the limitation of the hours of labor in mines. It would be quite possible to find another and equally appropriate title for it, such as "a bill for encouraging the introduction of coal cutting machinery in mines." The miner has for some time been the spoilt boy of the British public. The hazardous and arduous nature of his work appeal readily to popular sympathy, and as a consequence he already enjoys rates of remuneration and other privileges, that are far ahead of those available for any other body of laborers. It is notorious that he can live comfortably on the proceeds of 4 days work a week, and take pleasure excursions on the other two, and a look round the shops and markets in the coal districts, proves that he is not only able to provide the necessities, but also to enjoy the luxuries of life. No one begrudges him these advantages, nor would they deny further benefits, but for one consideration, and that is the effect of this new measure on the price of coal. If passed it will mean a permanent addition to the cost of raising coal, of 2s. to 3s. per ton, and the increased rate to the user will not be less, but probably a great deal more. The general trade of the country cannot stand such a serious increase. It would mean ruin to several branches of manufacture. For years past I have watched the gradual decay of manufacturing enterprise in this part of the country, which is mainly due to the fact that owing to the distance from the coal mines and the iron works, coal and iron cannot be obtained on terms that enable one to sell as cheaply as manufacturers situated in the North or the Midland districts, and the adoption

of the 8-hour bill would mean a similar result all over the country. Our own industry is, of course, interested to some extent in the price of coal as a necessary factor in meeting the demand for cheap gas, and the effect of a permanent addition to the cost would be a large reduction in the demand. Carburetted water gas processes would be adopted, and a great stimulus would be offered to any methods for increasing the yield per ton of coal.

The summer of 1907 was not a specially dry one, and, therefore, the problem of dust prevention on our public roads did not attract so much attention as in the previous year. But the fact that in addition to the nuisance caused by clouds of dust, there is also the loss caused by a more rapid disintegration of the road surface, which means increased cost for repairs, is becoming more and more appreciated. It is evident that the question of a smooth homogenous face to the roads, in place of a more or less rugged and loose one, is only a question of time, because the loose surface requires repairs—every 2 to 3 years, whilst a life of 7 years is predicted for the firm or bonded facing. Evidently it is a great advantage to bind the material by the use of a suitable aggregate, rather than to lay it loose, or to use sand or other finely divided solid as a binding or filling material. And for the preparation of a mixture that will meet these requirements there is nothing like gas tar. The subject was recently treated in detail by Mr. A. J. Metcalfe before the Society of Engineers. In the course of a paper on the treatment and formation of road surfaces, he mentioned three methods. These were (1) spraying of existing surfaces; (2) ordinary material, with a preservative binder subsequently applied, and (3) laying material previously mixed with a preservative. He spoke favorably of oil gas tar, 1 gallon of which would cover 8 square yards of surface for a first application and double the area for a second or subsequent dressing, the cost being ¼d. per square yard for the first, and ½d. per square yard for the following applications. This method could be easily applied without interfering with traffic, there was no objectionable odor, the surface was rendered practically impervious, there was no disintegration by motors, very little mud in wet weather and less noise. As regards the second method, coal tar preparations were the best binders. All water and light oil should be evaporated out of the tar and a continuation of fine weather was necessary if good work was to be done. The third method consisted of mixing suitable local material such as limestone, slag, etc., with dehydrated tar, and the cost of this method was nearly £1,000 per mile, or about £250 more than granite macadam. But in addition to the prolonged life there is a saving on the cost of scavenging. Various plans and modifications are being tried in various parts of the country, and looking at the different kinds of traffic to be considered it is evident that considerable judgment must be exercised and possibly that some experiments of a practical nature will be necessary before the best results are arrived at.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. Wm. Scade has been appointed Inspector of Gas and Meters for Louisville, Ky., under the amended ordinance recently signed by Mayor Harper. The appointment is very favorably regarded by all concerned.

The Holland (Mich.) Company is proposing to extend its distributing system to the outlying settlement of Zeeland. It is likely that a high pressure line will be put down. The distance to be covered is approximately 6 miles.

Mr. George B. Webb has been elected President of the Duquesne (Pa.) Lighting Company.

The annual election of the New Orleans (La.) Railway and Light Company is set for the 13th prox. It is pretty generally understood that less aggressive executive ability showings will be conducive to the welfare of the Company, wherefore it is now thought that Mr. E. C. Foster will not be re-elected to the Presidency. Mr. Hugh McCloskey, whose tact as a diplomat is well recognized in the Crescent City, may be asked to succeed Mr. Foster.

At a meeting of the Common Council, of Newark, N. J., held early this month, resolutions were adopted requesting the Public Service Corporation to discontinue the use of prepayment meters.

"Dear Journal: By the fiat of nature the baby, who is now the robust Mr. H. J. Pepper, General Superintendent of the Urbania and Champaign (Ills.) Railway, Gas and Electric Company, was born on the 29th of February; how many years ago the writer knoweth not. Last month the employees determined to give him a reminder that his natal day was not only rare but well worth remembering—the boys think pretty well of 'Boss' Pepper, whose treatment of them is the reverse of fiery. A committee visited the proprietor of the Hotel Beardsley and arranged with him for the preparation of a dinner to be served in the main dining room the evening of Saturday, February 29th—the Beardsley is Champaign's best house. By some clever inveigling Mr. Pepper was induced to visit the hotel at the time fixed. Entering the dining room he was astonished to note the arrangement of the tables and the number of persons present whom he knew. However, his wonderment was of short duration, for he was at once interviewed by Mr. Fred. M. Heimlicher, Toastmater and presiding officer of the occasion, and escorted to the seat of honor, and the feast was on. A feature of the occasion was the presentation to Mr. Pepper of a cunningly devised miniature anvil, made from one of the first street car rails laid in Champaign. The whole proceeding was a pronounced success.—P. R. G."

At the annual meeting of the shareholders of the Charleston (S. C.) Consolidated Railway, Gas and Electric Company the officers elected were: Directors, Philip H. Gadsden, E. H. Pringle, S. H. Wilson, J. S. Buist, A. B. Murray, J. M. Cameron, J. D. C. Bradley, W. M. Bird and J. H. Lawrence - the latter was chosen to succeed Major G. B. Edwards; President, P. H. Gadsden; Managing Director, S. H. Wilson; Secretary, P. H. Balaguer.

"M. R.," writing from Detroit, Mich., says: "I wish to call your attention to the fact that the Maintenance Baseball Club, of the Detroit Gas Company, will be ready to meet all-comers for the gas championship this year. That spry individual, Mr. C. Holt, is Manager. We will be ready for dates after April 10th."

The City Council of Jennings, La., has granted a franchise to Messrs. George S. Forrest and F. E. Bliss for the right to there operate a gas works. Mr. F. E. Bliss is President of the First National Bank, of Jennings, and is up to the full keeping of any promise that he makes.

John F. Starr, the surviving son of Jesse W. Starr, the founder of the old gas works constructing firm of Starr & Archer, of Camden, N. J., died at his home in that city some days ago. He was a Director in the Northampton (Mass.) Gas Light Company.

Editor Livingston has our congratulations on the March number of *Gas Logic*. The opening number thereof, written by "Louise Lamprey," on "The Wooing of Widow McPhee," is certainly original in respect of how the widow was won. However, less likely things have come to pass. The signature of the author "Lamprey" is also provocative of thought, for lampreys are often charged with emitting light. It ought, however, have with equal or greater effect been signed "Lampray," for instance.

At the April meeting in New York of the American Society of Mechanical Engineers, which is set for the evening of the 14th, Dr. H. S. Prichett, President of the Carnegie Foundation for the Advancement of Teachings, is listed to speak on the "Relation of the Engineer to the Body Politic."

Mr. Henry F. Farrow, of Cambridge, Mass., has petitioned the Council to institute the office of Inspector of Gas Piping. He also advocates the plan of obliging all gasfitters, prior to their engaging in business in Cambridge, to be examined and certified as to their fitness for such a vocation.

Mr. J. R. Rany, of Detroit, who is to be the local manager of the Iron Mountain (Mich.) Light and Fuel Company, says that the plant thereof will be in operation by August 1st. The Company proposes to go on under the franchise obtained last year by Alfred Glass, of Detroit.

"D. R. F.," writing from Bay City, Mich., under date of the 20th inst., says: "Mr. L. J. Gardner, who has acted for some time as Chief Clerk to Bay City Gas, Electric and Traction Companies, has been promoted to a responsible position with the Saginaw Gas Company. Mr. J. L. Lockwood succeeds Mr. Gardner at Bay City."

THE plans for the magnificent office building to be constructed by the proprietors of the Peoples Gas Light and Coke Company, at the intersection of Michigan avenue and Adams street, Chicago, are completed. When the structure is finished it will rank with the handsomest office buildings in the great business center of the heart of the United States.

"WHEN Mr. E. E. Eysenbach resigned the part of General Manager of the Binghampton (N. Y.) Gas Works Company to take up the management of the Consolidated Gas Company, Long Branch, N. J., his staff presented him with a handsome travelling bag. If he manages to keep in stock sufficient apparel to pack it tight whether on or off the road, he will never lack for change. 'Charlie' Bennett, fresh from Quebec, made the presentation speech, and made it well. The best wishes of the Binghamton boys go with Mr. Eysenbach wherever he goes.—L. R."

THE weekly meeting of the Quiz Club, of the Rome (N. Y.) Gas, Electric Light and Power Company, for early March, was notable for the paper read by Mr. R. A. Field, the Company's Superintendent, whose subject was: "Better Lighting: How to Get It and why It Pays." The lecture, for such it really was, was in Mr. Field's best vein, and those who listened to it were certainly benefited by it.

ON the 6th prox. the citizens of Port Huron, Mich., are to vote upon the proposition to construct and operate a gas plant on municipal account. Mr. James T. Lynn meanwhile does not seem to be losing any weight over the result—he was in the office last week, wherefore the diagnosis is a recent one.

THE "science" of reading gas and electric meters is part of the teaching order and schedule in the Bigelow grammar school of Newton, Mass.

MR. CHARLES A. TOWNE, formerly a member of the Massachusetts Board of Gas and Electric Light Commissioners, died at his home in Orange, Mass., the 18th inst.

"J. M. R.," writing from Boston under date of March 24th, says: "I have from time to time noted in the JOURNAL certain accounts of the convicting and punishing of prepayment meter thieves, and I hope you will continue to do so, for the effect of such reading cannot fail to be salutary. The best exposition of justice in respect of these larcenious operations seems to me to have been afforded last week in this city, when Lyman H. Barber, of 91 Marsella street, Roxbury district, was found guilty of robbing a prepayment meter, the trial being had in Superior Criminal Court, Suffolk district. The case was clearly proven, and the sentence was not more than 5 years nor less than 3 years, at hard labor, in the State prison, the first day to be passed in solitary confinement. Certainly, the convict's past record had much to do with the severity of the sentence. It is further worthy of note that since September last 87 arrests were made in Greater Boston for prepayment meter robberies, and 86 convictions have been secured."

AT the annual meeting of the Middletown (Conn.) Gas Light Company the officers elected were: President, W. H. Burrows; Secretary and Treasurer, H. L. Mansfield; Superintendent, S. D. Clark.

MR. R. A. GRAHAM, writing from Boston last Saturday, asks: "Why is it that the Humphrey gas arc is not pushed with greater aggressiveness in New Hampshire, Maine and Vermont?" To which we make reply that our thought was and is that such aggressiveness, if one may judge from the results obtained, for instance, in Burlington, Manchester, Nashua and Portland, respectively, was pretty well shown.

THE old plant of the Elizabethtown (N. J.) Gas Company, on South street, Elizabeth, which was first put in commission 50-odd years ago, was finally put out of commission the 19th inst.

THE gas plant of the Norwich (N. Y.) Gas and Electric Company will be fitted out with adequate purifying boxes this spring. The betterment scheme in general as at present outlined calls for the placing of not less than 5 miles of street mains.

AT the annual meeting of the Pen Argyl (Pa.) Gas Company the officers elected were: Directors, Milton Flory, C. N. Miller, E. A. Speer, J. R. Speer, J. R. Whitney, Walter Ede, C. M. Smith and W. M. Bennett; President, E. H. Speer; Vice-President, J. R. Whitney; Secretary and Treasurer, C. M. Smith.

"F. C. R.," incloses the following mention from Hamilton, Canada, dated the 24th inst.: "The 58th annual meeting of the Hamilton Gas Light Company was held last week, under the direction of the Company's President, the Hon. William Gibson, whom I am glad to say is as brisk as ever. In moving the adoption of the annual report the Chairman remarked that the year had been a very satisfactory one, considering the keen competition of natural gas and electricity. The receipts for gas, though less than last year, were largely compensated for by the greatly increased returns from residual products. Since last year the Company had installed an up-to-date plant for the utilization of crude tar and ammonia and the manufacture of roofing felt, refined tar, pitch and other tar products, which he was pleased to say were readily salable in Hamilton and vicinity. Another gratifying feature of the year's work was the large number of modern gas lamps and lighting appliances installed for new lighting consumers, many of which had heretofore used either coal oil, natural gas or electricity. He intimated that only the other day the Board had approved of a new scheme for the development of the lighting business which he felt sure would become very popular among storekeepers and the business public generally. The Company had decided to install free gas arc lamps and maintain these at no cost to consumers, thereby cutting out all initial cost of installing and the worry and expense the customer met with in connection with maintaining new mantles and keeping the lamps clean. This would be a great saving to many storekeepers. A dividend at the rate of 6 per cent. per annum was paid during the year. After expressions of satisfaction and approval, the old Board of Directors was unanimously re-elected, as follows: Hon. William Gibson, President; John Proctor, Vice-President; J. M. Eastwood, D'Arcy R. C. Martin, John A. Bruce, R. C. Fearman and William Hendrie."

"R.W.," in a message dated Dubuque, Ia., the 23d inst., says: "You know I'm a traveller, and while going the rounds I encounter or discover things which seem odd. In the last twelvemonth I have learned through the JOURNAL and otherwise that the residents of various cities have objected strongly and systematically to the locating in their particular districts of storage gasholders. The main objection, however, seems to lie in the thought that gasholders are of themselves not things of beauty, wherefore their presence robs many sections of their natural charms—if the disinterested reader could only look out upon or over some of these sections that were to be 'spoiled' by the construction of a gasholder I am certain all would at once admit the obviousness and truth of the saying that 'each eye forms its own beauty;' and I am led to all this through a visit recently paid by me to the wide-awake city of Waterloo, Ia. Some time since the Citizens Gas and Electric Company of that place determined to put up a storage holder, and their choice of a location therefor provoked a storm of protest. In the end the holder was erected and is now doing good service. But the tale is not all told. The other day an official of the Company invited me to take a look at the holder and I did. He further informed me that the grading going on around the banks of the tank and the footway about the banks was to be followed by the fixing up of a garden that will cause the foot circle of the storage vessel to bloom in the spring (also the summer and fall) like unto the blooming of any well-kept parterre. So we may say with the Latins, '*Extra lutum pedes habes!*'"

IT looks that General Manager James M. Robb, of the Chattanooga (Tenn.) Gas Company, will have a chance to oversee the construction this summer of a 1,000,000 cubic feet storage holder.

MR. H. W. SESSIONS, who is the General Manager and Engineer-in-Charge of the Jalisco Heat, Light and Power Company, the first plant of which is to be erected at Guadalajara, Mexico, will likely visit this country soon, for the purpose of making contracts for apparatus. As we understand it, the initial works is to be planned for the daily production of 1,000,000 cubic feet. Mr. Sessions was formerly in the employment of the Edison Company, Los Angeles, Cal.

THE Light, Heat and Power Department, of St. Thomas, Ont., is arranging for the placing of an ammonia plant in the gas works division of the city's public service. Notable main extensions are also planned for this summer.

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MONDAY, MARCH 30, 1908.

The Market for Gas Securities.

The expected happened; that is, if a rise of 15 points for the week in Consolidated can be called a happening. Some of the gentlemen who early this year thought it was a good short at 100 or so will have the satisfaction shortly of knowing that they knew too much. The first movement culminated yesterday when the stock sold off 2 points from the high. To-day, however, the rise is again on, at noon sales having been made at 116¼. The stock is still very cheap.

The real surprise of the week, however, was the move in Brooklyn Union, which was 105 bid this morning. Peoples of Chicago, crossed the 90 mark to-day, and the general all-round situation looks good to the average investor, many of whom have been picking up small lots of bonds. Washington (D. C.) is a trifle easier, but we unhesitatingly declare that 325 is not an unlikely price before July 1st.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

MARCH 30.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	116¼	116¾
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	92	7
Equitable Gas Light Co.—				
Con. 5's, due 1962, M. & S.	1,000,000	1,000	—	105
Mutual	3,500,000	100	—	170
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	84	86
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98	104
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	100	105
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union—				
1st 5's, due 1947, J. & J.	1,250,000	1,000	90	98
Standard	5,000,000	100	70	100
Preferred	5,000,000	100	100	125
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	104	110
1st Con. 5's, due 1948, M. & N.	15,000,000	—	91¾	92
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	1	11-16
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47¾	50
Buffalo City Gas Co.	5,500,000	100	5	8
" " Bonds, 5's	5,250,000	1,000	63	66
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	91	91¾
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	92	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	87	88
Preferred	3,026,500	100	81	82
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	105
Mortgages, 6's	3,600,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Detroit City Gas Co	6,000,000	50	—	50
" Prior Lien 5's	4,618,000	1,000	—	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Lt. Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	100	105
" Bonds, 5's	10,500,000	—	101	103½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	240,000	10	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	97	97½
Preferred	2,500,000	100	93½	93
Bonds	10,000,000	1,000	104	104½
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	51	51¾
Preferred	25,000,000	100	82½	82¾
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	86	88
Bonds, 6's	6,000,000	—	137	138
New Haven	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	90	90¼
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Elec. Co.	2,120,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	103½
San Francisco, Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	751,000	1,000	92	—
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	96¼	—
Syracuse, N. Y.	1,378,000	100	50	55
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DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., March 11, 1908.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable April 15th, 1908, to stockholders of record at the close of business, March 31, 1908. Checks will be mailed.

1710-5 LEWIS LILLIE, Treasurer.

COMPETENT GAS MANAGER

Desires permanent position with gas company as **MANAGER or SUPERINTENDENT.** Qualified to take entire charge of coal or water gas plant. Fifteen years' experience. Address, 1710-3 "COMPETENT," care this Journal.

Position Wanted

By thorough, experienced manager of gas, electric or combination property. Experienced in all branches of gas and electric manufacture and distribution work, together with ability in up-to-date new business methods. Experience in rebuilding and construction engineering. Will be open for engagement after April 1. Correspondence solicited. Good references. Address, 1709-4 "J. S. D.," care this Journal.

ENGINEER,

Experienced in the management of gas and electric properties, open for engagement. Understands the manufacture of both water and coal gas. Can give satisfactory references. 1711-3 "GAS ENGINEER," care this Journal.

Superintendent of Construction.

Open for engagement after April 1st, 1908. Supervising central station installations, either gas, electric or general power equipment. Will take charge of the remodeling of old properties. Experienced in all branches of the gas and electric business. Can give references. 1711-3 Address, "ENGINEER," care this Journal.

Position Wanted.

A young married man, who has had nine (9) years practical experience in operation and construction of large and small gas properties, both North and South, would like to get in communication with parties negotiating improvements along these lines. References furnished. 1711-3 Address, "M. C. B.," care this Journal.

Position Wanted.

GASFITTER OR COMPLAINT MAN.

High or low pressure. Capable of taking charge of distribution department. A-1 references. Nine years' experience. 1711-2 Address, "A. T. C.," care this Journal.

Position Wanted

By a Sober, Experienced Fitter.

Competent to manage shop or street work. Is an Eastern man. 1712-1 Address, "M. W. H.," care this Journal.

Position Wanted

AS FOREMAN.

Thoroughly understands the operation of recuperative benches. Has had 15 years' experience in construction and operation of plants. 1712-1 Address, "A. W.," care this Journal.

Position Wanted.

Experienced and capable manager and superintendent for small or medium coal or water gas property, will be open for employment after May 1. Correspondence solicited. 1712-2 Address, "M.," care this Journal.

WANTED.

Position as Superintendent or Manager,

By one who has had wide experience and has met with success in above capacity. Can furnish excellent references. 1712-1 Address, "STATION A," care this Journal

WANTED,

A Good Solicitor,

Capable of taking care of complaints, as well as solicitations, for gas company in a city of about 20,000. Address, "D. M. E.," 1711-2 Care this Journal.

Water Gas Maker.

We want a sober, reliable man, who understands the operation of water gas apparatus, and who can do gasfitting well. Daily output 30,000. Steady work for the right man. 1710-tf Address, "W. N. M.," care this Journal.

WANTED,

One Good Second-hand 6-inch or 8-inch Gas Exhauster Complete.

Inquire of

STANDARD GAS AND ELECTRIC CO., 1686-tf RALEIGH, N. C.

FOR SALE,

One 7 Feet High Carburetter Water Gas Apparatus with Divided Blast.

Made by Western Gas Construction Co. Used only a short time. For particulars write the

SOLVAY PROCESS COMPANY, 1708-3m Syracuse, N. Y.

FOR SALE,

FOUR SECOND-HAND PURIFIERS.

Dimensions, 10 feet by 14 feet by 3 feet deep, with dry center valve and connecting pipes 10 inches diameter. Seal 16 inches deep. Inquire of the

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FOR SALE.

One 8-Horse Power Horizontal Engine, cylinder 5 inches by 12 inches, steam pressure 60 pounds.
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One No. 4 McKenzie Exhauster for 10-inch connections. Address,
1710-6 TAUNTON GAS LIGHT CO., Taunton, Mass.

FOR SALE,

Two New No. 9½ Green Horizontal Gas Exhausters or Blowers. Capacity per revolution, 55 cubic feet; 20-inch connections.

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For particulars, address, SEMET-SOLVAY COMPANY, 1711-3m Syracuse, N. Y.

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Utilize Your Gas Liquor.
NO EXTRA LABOR OR OPERATING EXPENSES.
IMPROVED AMMONIA CONCENTRATOR.
About 100 in use. Write to
STROH & OSIUS, Patentees, or
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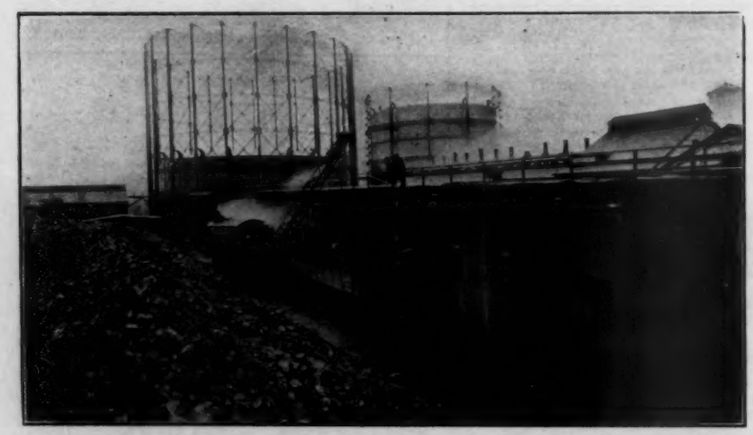
Gas Engineer's Pocket-book, HENRY O'CONNOR
Comprising Tables, Notes and Memoranda relating to the Manufacture, Distribution and Use of Coal Gas, and the Construction of Gas Works. PRICE, $3.50. For Sale by
A. M. Callender & Co., 42 Pine St., New York City.



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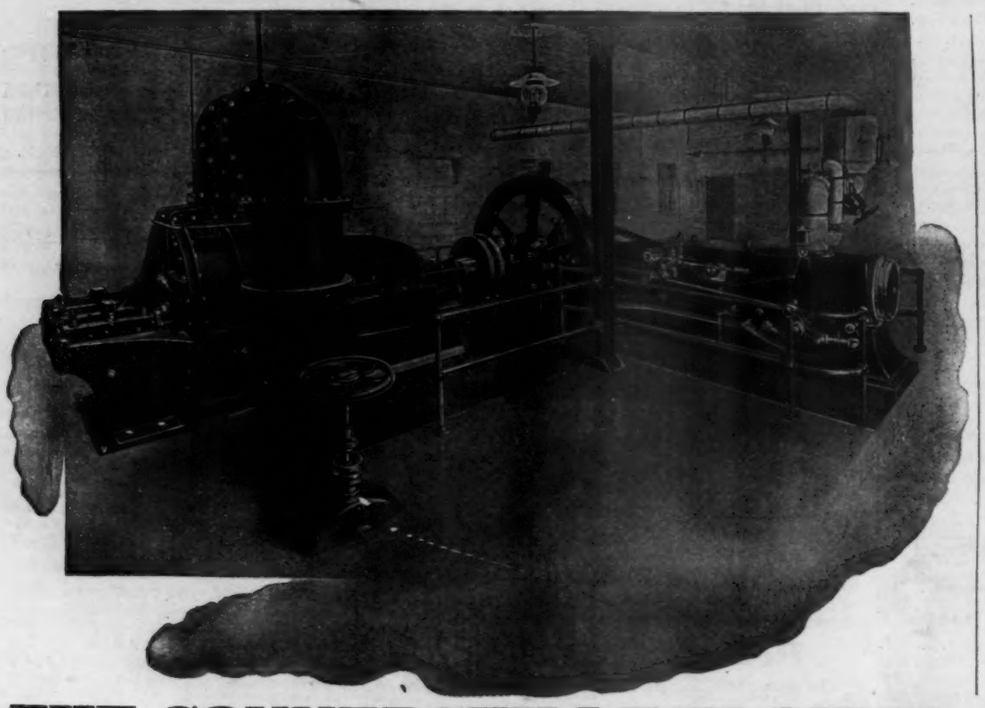
AND HIGH PRESSURE GAS PUMPS.



THIS cut shows one of our High Pressure machines and a 4-valve engine connected by one of our leather link flexible couplings. Two of these units were installed for the Peoples Gas Light and Coke Co., Chicago, at their 73d St. Station. Each machine has a capacity of 14,000,000 cubic feet per day.

We also manufacture

**GAS VALVES,
BY-PASS VALVES,
PRESSURE REGULATORS,
ETC., ETC.**

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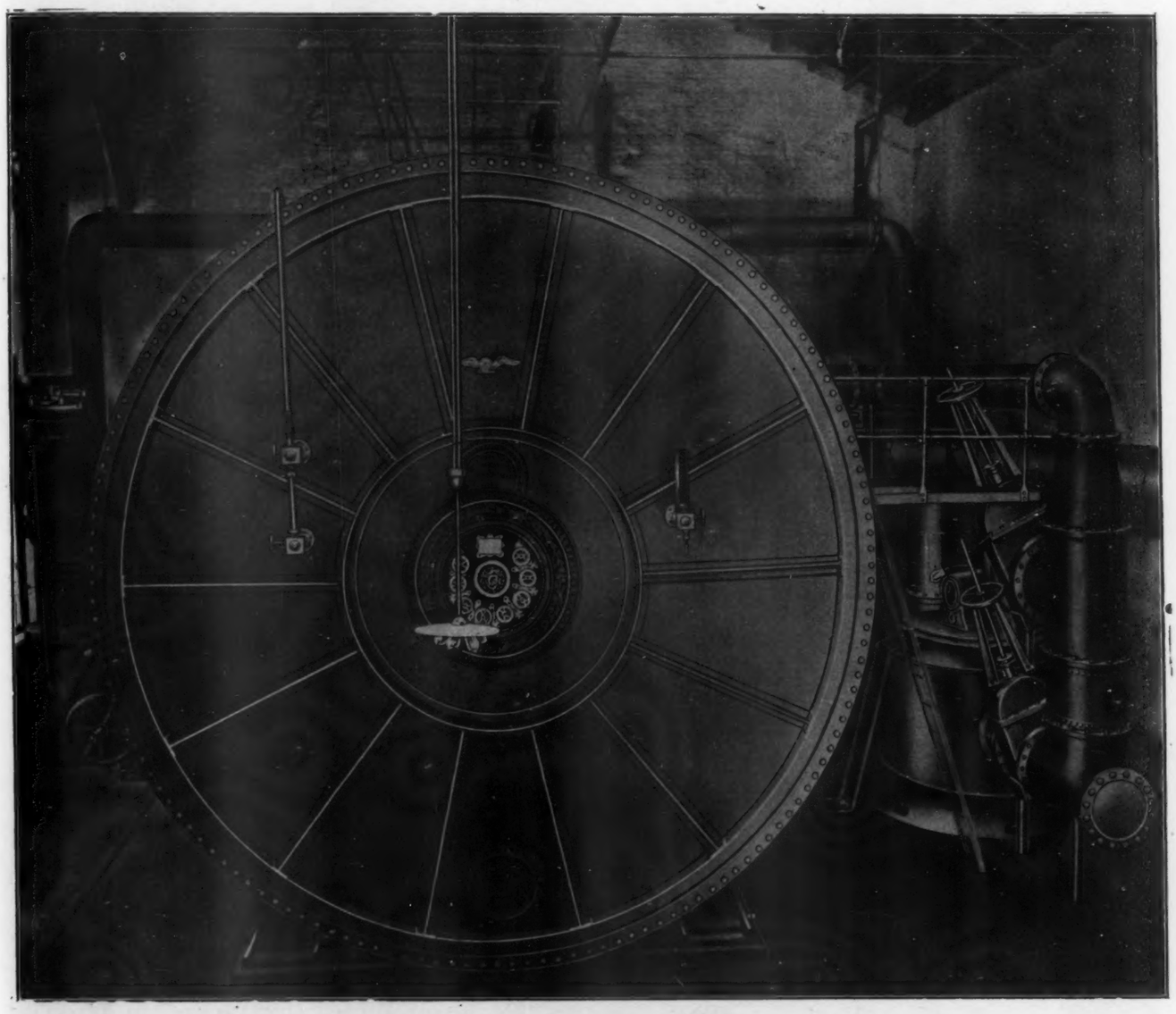
The Economical Gas Apparatus Construction Co., Ltd., Toronto, Can.

EUROPEAN CONNECTIONS:

The Rotary Meter Co. (1905) Ltd., Manchester, England.

Compagnie pour la Fabrication des Compteurs et Materiel d'Usines a Gaz, Paris, France.



Interior View of part of Meter Room—Twenty-first Street Works,
CONSOLIDATED GAS COMPANY, NEW YORK.
Old Style Wet Meter, 6,000,000 cu. ft. capacity per day.

ROTARY STATION METER,

4,000,000 cu. ft. capacity per day (at right of picture).

One-half the cost—One-tenth the space of old style wet meters.

When in need of Station Meters, write

ROTARY METER COMPANY,

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NEW YORK.

Send for Catalog.

P. PLANTINGA, President W. E. STEINWEDELL, Secretary

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Main Office and Shops

CLEVELAND, OHIO.

NEW YORK OFFICE, 56 PINE STREET.

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January 1st, 1908.

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Our new Firebrick Factory has been completed and we are now ready to take orders for high grade fireclay products of any description and magnitude. We design and build

Coal Gas Benches,

VERTICAL, INCLINED OR HORIZONTAL RETORTS,

LATEST PATENTED SYSTEMS.

Coke Ovens,

BEEHIVE AND BY-PRODUCT CONSTRUCTION.

Manufacture Linings for Water Gas Apparatus, Rotary Cement Kilns, Blast Furnaces and Stoves, Steel Furnaces, Lime Kilns, Cupolas, etc., etc.

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WE IMPORT THE FINEST FIRECLAY FOR SPECIAL HIGH GRADE WORK.

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Bench construction of most modern type, with horizontal, inclined and vertical retorts, together with retort houses, coal and coke handling machinery, specially designed to suit the characteristic requirements of the benches.

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Plans for modern and up-to-date coal and water gas plants. Modernizing existing plants to cheapen costs of production. Valuation of plants, etc., etc.

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Berlin, Germany.

RETORT PATCHING CEMENT

THE

RETORT DECARBONIZING TILE

OLD RELIABLE "LACLEDE" GAS BENCHES

ARE BEING BUILT TODAY BY THE

LACLEDE-CHRISTY CLAY PRODUCTS CO.

ST. LOUIS, MO.

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THIS LAMP SELLS EASILY.

For those who desire a medium priced lamp, the No. 4 Ramsdell Inverted is unquestionably the most satisfactory.

You will find it one of the best sellers, and a lamp which will do "missionary work" when once installed, inducing the customer to put in a full line of Ramsdell lamps.

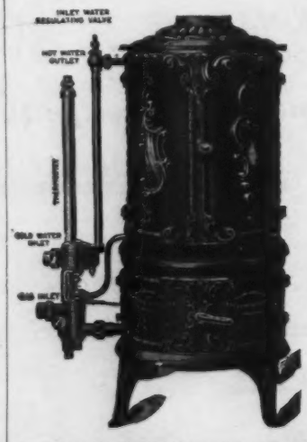
The No. 4 Ramsdell produces 65 candles of light, consumes 2½ to 3 feet of gas per hour, is finished in black or brushed brass.

List price, $1.65, with globe, mantle and adaptor.

RAMSDELL INVERTED GAS LAMP COMPANY,

Geo. G. Ramsdell, President,

1123 Broadway, New York.



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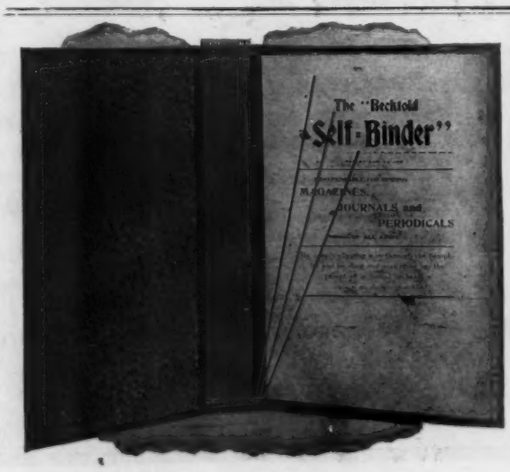

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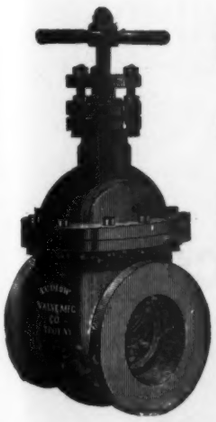

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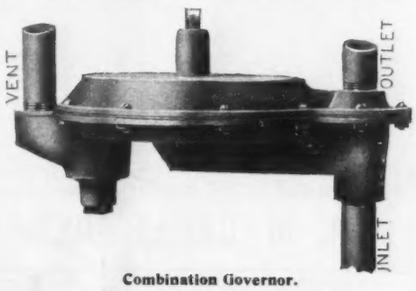

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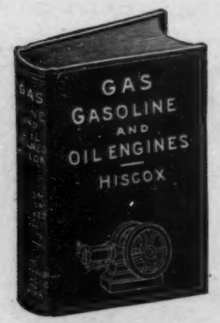

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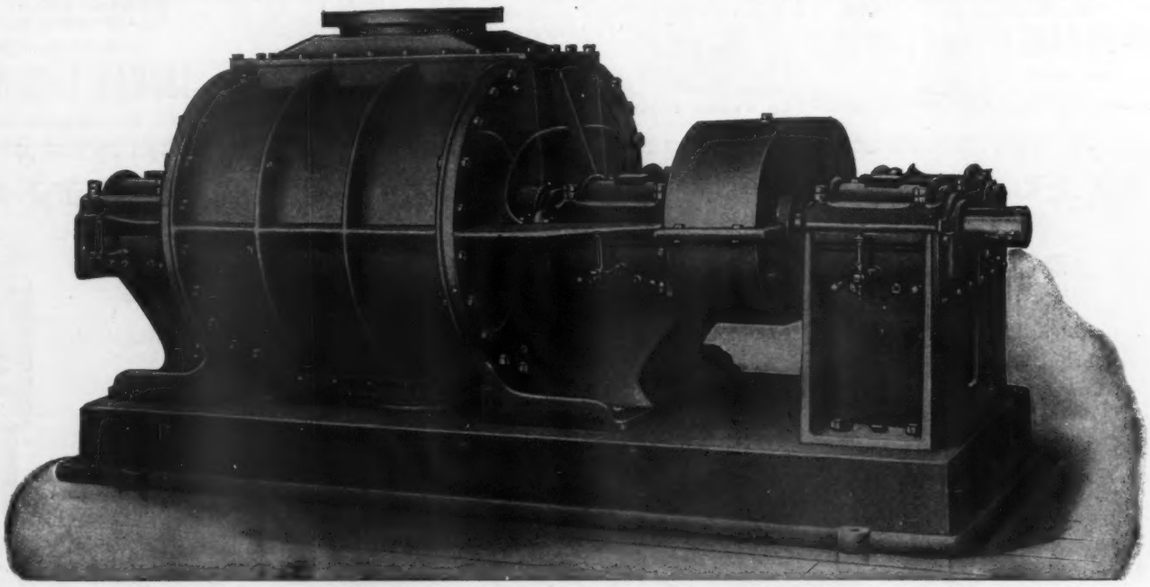

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PUBLIC LIGHTING TABLE.

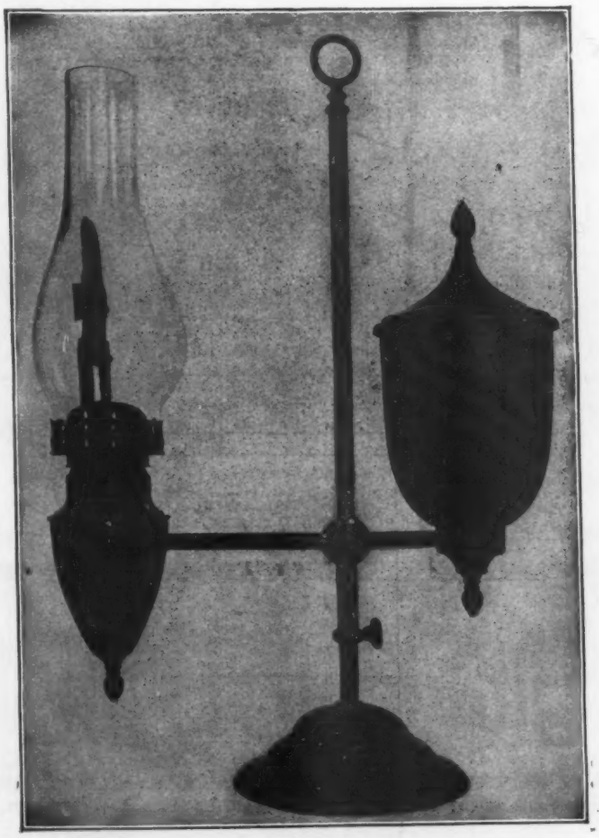
APRIL, 1908.

Day of Week.	Table No. 1. FOLLOWING THE MOON. Date.	Light.	Extinguish.
Wed,	1	6.50 PM	4.40 AM
Thu.	2	6.50	4.40
Fri.	3	6.50	4.40
Sat.	4	6.50	4.40
Sun.	5	10.30	4.30
Mon.	6	11.20	4.30
Tue.	7	12 20 AM	4.30
Wed.	8	1.00 FQ	4.30
Thu.	9	1.40	4.30
Fri.	10	2.20	4.30
Sat.	11	2.50	4.30
Sun.	12	3.20	4.30
Mon.	13	3.50	4.30
Tue.	14	4.10	4.30
Wed.	15	No L.	No L.
Thu.	16	No L FM	No L.
Fri.	17	No L.	No L.
Sat.	18	7.10 PM	10.00 PM
Sun.	19	7.10	11.00
Mon.	20	7.10	12.10 AM
Tue.	21	7.10	1.10
Wed.	22	7.10	2.10
Thu.	23	7.10 LQ	3.00
Fri.	24	7.10	3.40
Sat.	25	7.10	4.00
Sun.	26	7.20	4.00
Mon.	27	7.20	4.00
Tue.	28	7.20	4.00
Wed.	29	7.20	4.00
Thu.	30	7.20 NM	4.00

TOTAL HOURS DURING 1908.

By Table No. 1.

	Hrs. Min.
January	228.30
February	187.30
March	192.00
April	160.10
May	155.10
June	138.00
July	155.50
August	173.40
September	185.20
October	214.00
November	218.10
December	226.40
Total, yr.	2235.00



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2d. It is remarkably steady. Will burn 24 hours continuously with less than 2 per cent. variation.

3d. It is much less dangerous than Pentane, which is a kind of gasolene.

4th. It is not easily affected by air currents in the photometer room.

5th. Since the lamp may burn continuously, the candle power of gas may be taken at any moment, if necessary. This insures steady illuminating power without waste of carburetting material.

6th. The first cost of the lamp brings it within the reach of even small gas works.

7th. Costs much less to maintain than a Pentane lamp or sperm candles doing the same service.

8th. Is not affected by the weather.

PUBLIC LIGHTING TABLE.

APRIL, 1908.

Day of Week.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Date.	Complete Lighting in One Hour From Time Given P. M.	Complete Extinguishing in 50 Minutes From Time Given A. M.
Wed.	1	5.57	4.47
Thu.	2	6.07	4.37
Fri.	3	6.07	4.37
Sat.	4	6.07	4.37
Sun.	5	6.07	4.37
Mon.	6	6.07	4.32
Tue.	7	6.07	4.32
Wed.	8	6.07	4.32
Thu.	9	6.17	4.22
Fri.	10	6.17	4.22
Sat.	11	6.17	4.22
Sun.	12	6.17	4.22
Mon.	13	6.17	4.22
Tue.	14	6.17	4.22
Wed.	15	6.17	4.22
Thu.	16	6.27	4.17
Fri.	17	6.27	4.17
Sat.	18	6.27	4.17
Sun.	19	6.27	4.12
Mon.	20	6.27	4.12
Tue.	21	6.27	4.12
Wed.	22	6.27	4.12
Thu.	23	6.37	4.02
Fri.	24	6.37	4.02
Sat.	25	6.37	4.02
Sun.	26	6.37	4.02
Mon.	27	6.37	4.02
Tue.	28	6.37	4.02
Wed.	29	6.37	4.02
Thu.	30	6.47	3.52

TOTAL HOURS DURING 1908.

	Hrs. Min.
January	481.50
February	329.15
March	351.50
April	341.50
May	233.05
June	218.10
July	282.55
August	254.55
September	292.25
October	420 45
November	374.30
December	411.05
	3992.35
Deduct on account of 50 min. extinguishing time	30.30
Total, yr.	3962.05

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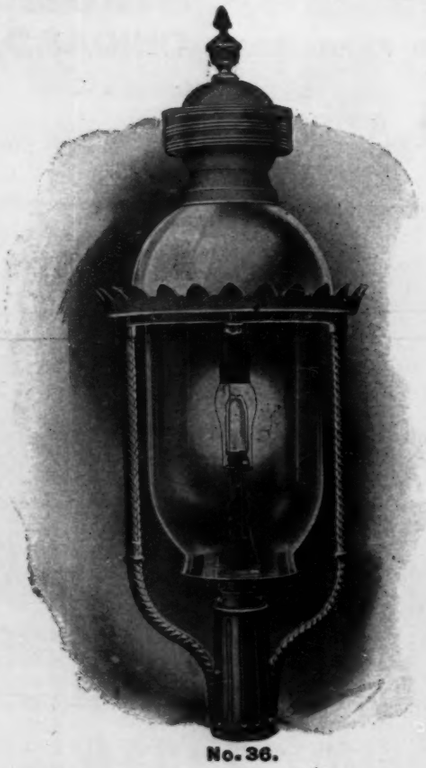

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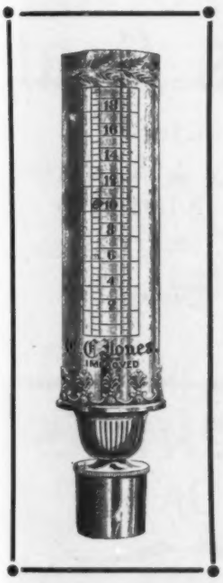

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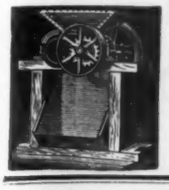

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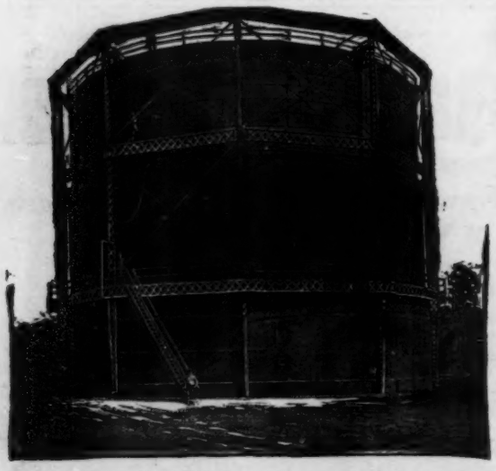

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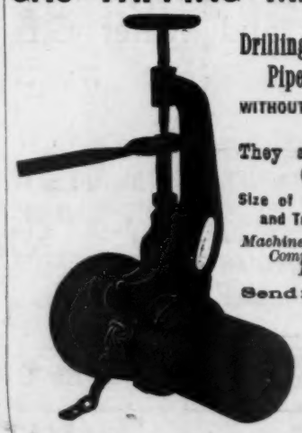

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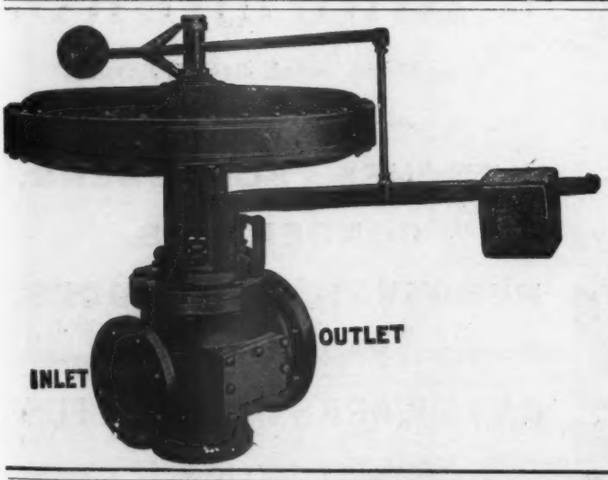

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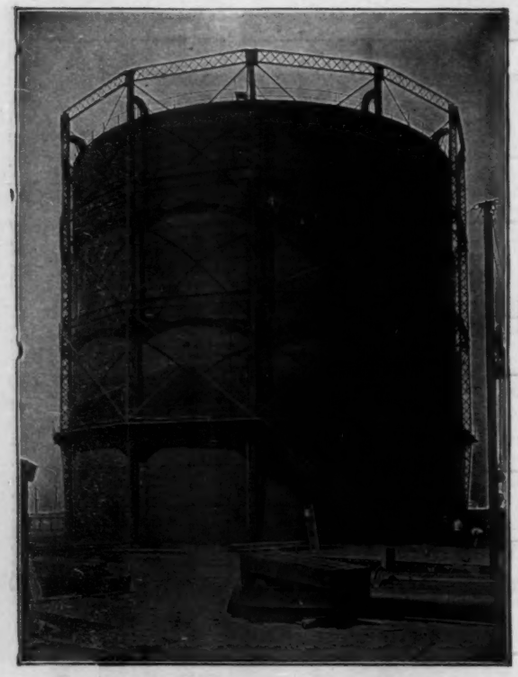

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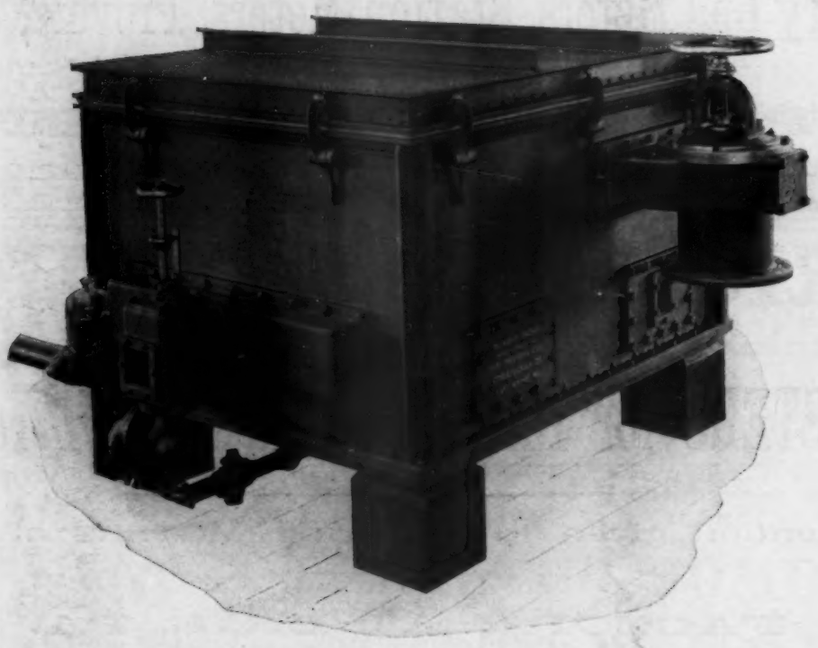
BUHL Meters will need few Repairs. We make our own Tin Plate. Trial Orders Solicited.

THE WESTERN GAS CONSTRUCTION COMPANY
WORKS AND MAIN OFFICE FORT WAYNE IND U S A
GAS ENGINEERS
EASTERN OFFICE NEW YORK CITY. WESTERN OFFICE SAN FRANCISCO.
1909 Broad Exchange Building. 589 Howard Street.

MULTIPLE AMMONIA WASHER.



An apparatus whose function is the preliminary treatment of Coal Gas, by the liquor from the scrubber, for the removal of ammonia, sulphur compounds, and mechanically suspended matter.

In a series of tests, recently conducted, it was demonstrated that our washer alone removed 40 per cent. of the ammonia in the gas; from which it will be seen that by the use of our washer the efficiency of the scrubbers is materially increased.

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